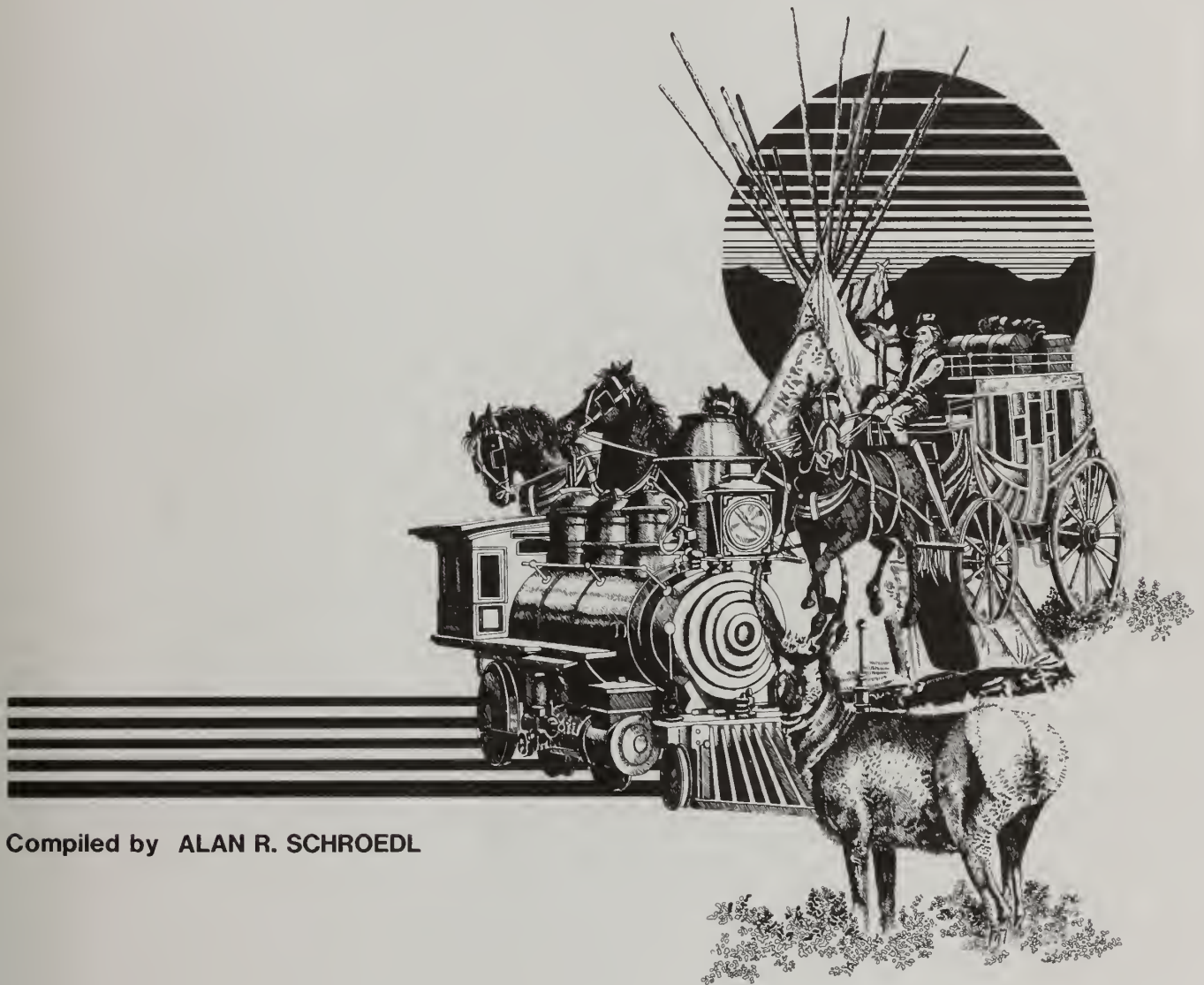




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Archaic and Late Prehistoric Adaptation in Southwestern Wyoming

The **FRONTIER PIPELINE** **EXCAVATIONS**



Compiled by ALAN R. SCHROEDL

Bureau of Land Management
Wyoming

Cultural Resource Series No. 3

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ARCHAIC AND LATE PREHISTORIC ADAPTATION IN SOUTHWESTERN WYOMING:

THE FRONTIER PIPELINE EXCAVATIONS

compiled

by

ALAN R. SCHROEDL

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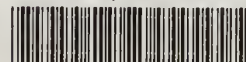
with appendices by

Craig S. Smith, Alan R. Schroedl and Robert Huggins

P-III Associates, Inc.
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1984

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FOREWORD

This project represents an attempt to clarify and expand the prehistoric information base of a portion of southwestern Wyoming. At the same time, this project provides a compelling example of how the protection of our Nation's cultural heritage and values need not conflict with the goals of energy development. Considerable time and coordination contributed to the project's overall success--clearly a commentary on the abilities of all parties involved.

The study presented herein is an extensive data recovery program by P-III Associates at six prehistoric sites near Church Butte, in northeast Uinta County, Wyoming. This excavation program was part of the Bureau of Land Management (BLM) compliance requirements for approval of the 288-mile Frontier Crude Oil and Condensate Pipeline from Evanston to Casper, Wyoming. The excavations resulted in the recovery of over 20,000 artifacts and the discovery of more than 35 features. The excellently described results of this project (with ample graphics) provide a valuable research contribution and readable reference to the prehistory of the area from the Early Archaic to Late Prehistoric periods.

It is with pleasure that we present the third volume of the continuing Wyoming series of BLM cultural resource monographs. We believe this publication will be of interest and value to the professional community as well as others who share our concern to protect the vast array of cultural resources on public lands.

Raymond C. Leicht, Ph.D.
Wyoming BLM State Archaeologist
Cheyenne, Wyoming
May 1985

ABSTRACT

In 1983 P-III Associates conducted a data recovery program on six prehistoric sites (48UT390, 48UT199, 48UT779, 48UT370, 48UT445 and 48UT377) near Church Butte in southwestern Wyoming for the Frontier Pipeline Company. Excavations at these sites produced archeological assemblages ranging from the Early Archaic period to the Late Prehistoric period. The limited range of data recovered from the Archaic components precluded detailed discussions of Archaic settlement and subsistence patterns. However, the quantity of material recovered from the Late Prehistoric components allowed for some reconstruction of the subsistence pattern during the Late Prehistoric period in the Church Butte area. The bulk of the artifactual material and information about prehistoric lifeways during the Late Prehistoric period was recovered from the Austin Wash Site (48UT390), a Late Prehistoric antelope processing site. At least 15 antelope and two bison were completely processed at this site during a late summer/early fall occupation near the end of the eight century A.D. The range of information recovered during this project is a strong addition to the prehistoric database of southwestern Wyoming.

ACKNOWLEDGMENTS

Whenever a project of this size and scope is finally completed, there are a myriad of individuals and agencies that must be thanked and acknowledged for their assistance in bringing the project to fruition.

Frontier Pipeline Company provided the necessary funds to complete this project. Frontier Pipeline manager, Josh Akan, Chief Engineer, Joe Pavlus and spread chief, C. R. Fredrick, and Jim Bell of Standard Oil of Indiana are thanked for their help and support of this project. Special thanks are due to Ralph Feeney, senior ecologist for Standard Oil, who was our primary contact with Frontier and helped us expedite the project.

The supervising agency for this project was the Bureau of Land Management (BLM). Dave Vlcek, BLM Kemmerer Resource Area archeologist, was our primary contact. In addition, Dean Decker of the BLM Salt Wells Resource Area and Mike Bies of the Rawlins District also participated in various aspects of the project.

The backbone of any excavation project are the field personnel. For all or part of this project, the crew chiefs were Nancy Coulam, Lynn Harrell, Scott McKern and Pat O'Brien. For all or part of the season, crew members consisted of Bill Batterman, John Benko, Allison Bingham, Brad Coutant, Barbara Cox, Colin Garvey, Mike Hall, Donna Hough, Judy Jacobson, Thegn Ladefoged, David Malmquist, Brenda Martin, Bill McMillan, Sylvia Miller, Heidi Roberts, Ron Savage, Dean Schleisman, Jamie Schoen and Patti Thompson.

Geomorphological reconnaissance was conducted by Jack Oviatt and the magnetometer survey was conducted by Robert Huggins, Spectrum Geophysics, with assistance from several of the field crew members.

A number of individuals also participated in the laboratory phase for this project. General laboratory tasks were completed by Gary Popek, Peter Devine, Mona Baker, Kae Smith, Suzanna Montague, Ron Savage, Donna Hough, Jamie Schoen, Judy Jacobson, Allison Bingham, Heidi Roberts, Steve Carlstrom and Martha Hemphill. Faunal analysis was conducted by Ken Juell and Ernest Walker; debitage was analyzed by Betsy Tipps and Christian Miss. Craig Smith conducted both the pollen and flotation analyses.

The crew chiefs, Lynn Harrell, Scott McKern and Pat O'Brien, prepared preliminary drafts of the site descriptions and features for each of the sites. Additionally, Pat O'Brien analyzed the lithic tool assemblages from the Austin Wash Site, 48UT199 and 48UT370, and also prepared portions of

some of the concluding chapters. Craig Smith, Ken Juell, Christian Miss and Robert Huggins contributed sections to the report. The final compilation, revisions and editing were completed by Alan Schroedl.

Drafting was completed by Craig Smith and Mindy Horne. Line drawings of artifacts were completed by Gene Austin, Kae Smith and Donna Hough. Artifact photos were taken by Alan Schroedl. Michelle Sanders typed and proofread the drafts and final report and Sharon Arnold edited the report.

Additionally, several other individuals must be thanked for their assistance in this project. Steve Creasman of Western Wyoming College provided reports and aided in the file search for site locations in the project area. LaMar Lindsay, Assistant State Archeologist of Utah, provided invaluable aid in the pollen analysis. Beverly Albee of the Garrett Herbarium assisted Craig Smith in identifying the carbonized plant remains. Ernie Hardin, George Lanier and Walter Dodd assisted in the examination and analysis of the stone bead from the Austin Wash Site.

To all of these people, we wish to express our thanks for the completion of the Frontier Pipeline excavation project.

Alan R. Schroedl
November 1984

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CHAPTER 1

INTRODUCTION

During the spring and summer of 1983, P-III Associates, Inc., of Salt Lake City, Utah, conducted an extensive data recovery program at six pre-historic sites near Church Butte in southwestern Wyoming for Frontier Pipeline Company of Chicago, Illinois. The excavation program was part of the compliance requirements for Bureau of Land Management (BLM) approval of the 288-mile Frontier crude oil and condensate pipeline from Evanston to Casper, Wyoming. The excavations encompassed more than 500 m² and resulted in the discovery of more than 35 features and the recovery of over 20,000 artifacts and ecofacts. The occupations excavated during the project range from the Early Archaic to the Late Prehistoric periods.

Project Background

Various federal laws and regulations charge the BLM with protecting significant cultural resources on BLM lands and insuring that these resources are neither damaged nor destroyed by federally licensed projects. Thus, when Frontier Pipeline Company planned to build the pipeline, the BLM required that the company initiate a cultural resource program as part of the procedures for federal licensing and lease approval.

An intensive Class III cultural resource inventory was completed along the pipeline right-of-way in the fall of 1982. As a result of these investigations, the BLM required Frontier Pipeline Company to conduct a data recovery program on six sites along the route prior to construction. These six sites, the Austin Wash Site (48UT390), 48UT199, 48UT779, 48UT370, 48UT445 and 48UT377, are all located within a few miles of Church Butte in southwestern Wyoming (Figs. 1, 2). Frontier Pipeline contracted with P-III Associates in April, 1983, to implement the data recovery program at these six sites. The work was conducted under an excavation permit granted to P-III Associates on April 21, 1983, by the Departmental Consulting Archeologist, Department of Interior. Field excavations commenced on April 28 and continued through June 30, 1983, with a crew ranging from 10 to 23 individuals. Alan R. Schroedl was the Principal Investigator. Nancy J. Coulam, Lynn H. Harrell, Scott T. McKern and Patrick M. O'Brien served as crew chiefs during the project. David Vlcek, BLM Archeologist, Kemmerer Resource Area, monitored the project's progress.

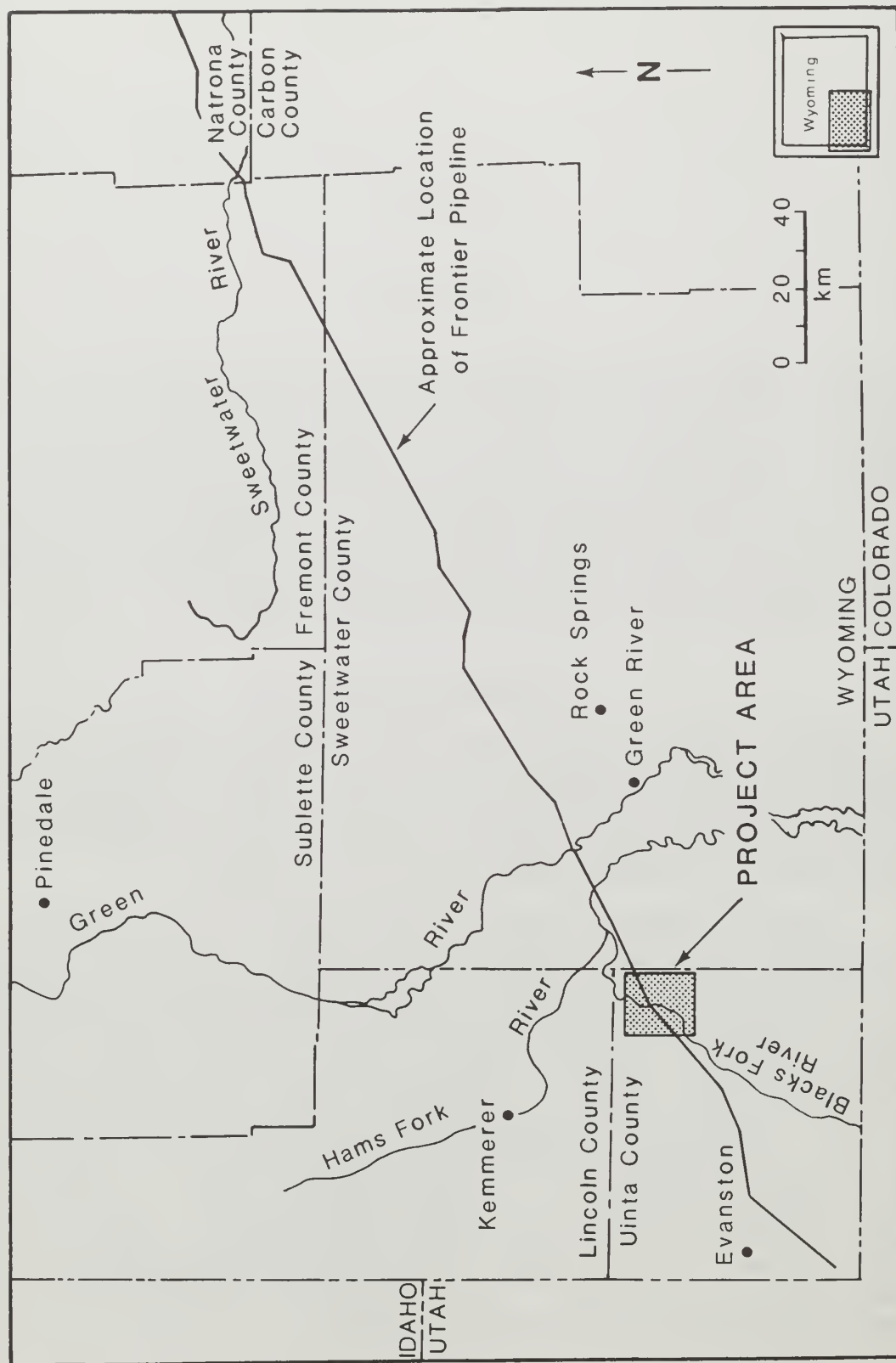


Fig. 1. Map of southwestern Wyoming showing general project area.

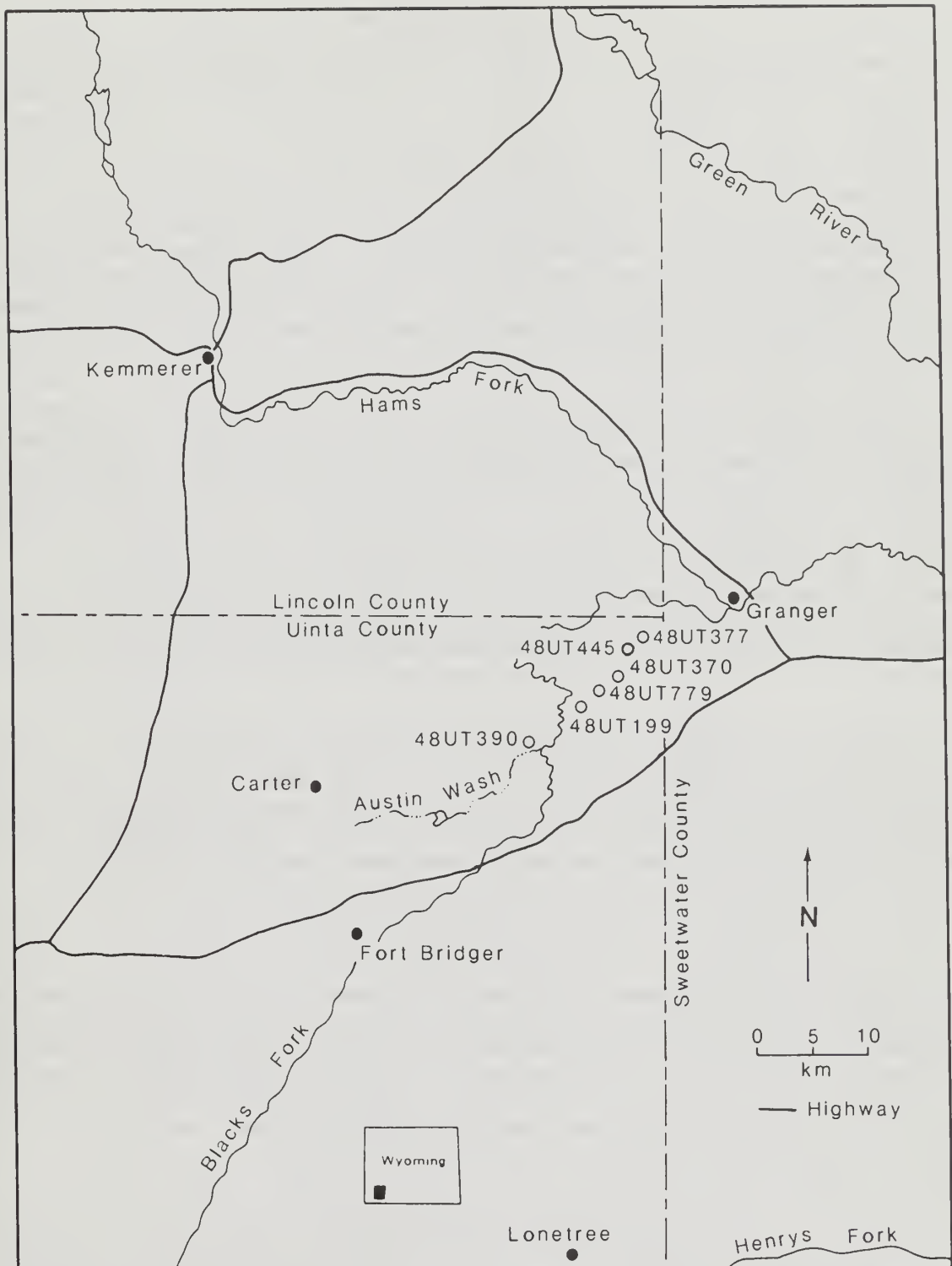


Figure 2. Map of project area showing the general location of the sites, Uinta County, Wyoming.

Research Orientation

Until the mid-1960s, the goal of most data recovery programs was to recover as much data as possible from sites that were to be damaged or destroyed. In essence, the data was collected not for problem-oriented research, but to salvage the data for future research once the sites themselves were destroyed (e.g., Jennings 1966). With the passage of a variety of federal laws in the 1960s and 1970s, it became apparent that data could not continue to be collected indiscriminately, and archeologists began to rethink the function of major salvage projects. What emerged was a consensus that such projects should have a more focused approach by attempting to address significant research questions. Since that time, there has been a trend from simply recovering artifactual data to recovering specific types of data for addressing specific research questions.

The emphasis on developing project specific research goals, particularly in relation to federally funded or licensed projects, culminated in 1980 with the publication of Treatment of Archeological Properties: A Handbook by the Advisory Council on Historic Preservation (1980). This handbook essentially stated that, in the view of the Advisory Council, archeological sites are not significant simply for their artifactual content, but rather for the research questions that can be answered by the data they contain. The Advisory Council noted that preservation of such data through site protection was always the preferred alternative to data recovery, but they also realized that such preservation was not always possible and that data recovery programs would have to be implemented.

Since the handbook was published, data recovery programs have become increasingly oriented towards addressing specific research questions rather than simply recovering artifactual data. With this changing emphasis in mind, the BLM identified a series of research themes based on previous projects in the area and on information obtained during previous testing programs at some of the sites (Metcalf and Anderson 1982a, 1982b).

Cultural Chronology

Because the existence of a temporal framework is a prerequisite for examining more sophisticated research problems (e.g., settlement and subsistence patterns, trade networks, etc.), the first research theme was refinement of the cultural chronology of the Green River Basin. Previous researchers have applied both Great Basin and Northwestern Plains chronologies to southwestern Wyoming, but there is still some uncertainty surrounding their applicability to the Green River Basin.

Subsistence Patterns

While none of the sites were expected to reflect the full range of the subsistence activities of a particular cultural system, it was expected that each would contribute some data to the general understanding of the local subsistence pattern. The data recovery plan called for the analysis

of faunal material as well as pollen and flotation samples to provide information on subsistence activities such as procurement, processing and storage, and how these activities related to site function and the season of occupation.

Settlement Patterns

Another research theme was the identification of prehistoric settlement patterns in the region, insofar as possible. Because sites cannot be interpreted in a settlement pattern framework until their function is known, a major goal of the data recovery project was to identify cultural assemblages that could be assigned particular functions. Artifacts, the byproducts of manufacture, processing and procurement activities, can often be used to infer site function. For example, hunting activities might be evidenced by the presence of arrow-shaft straighteners, projectile points and projectile point blanks and preforms. Scrapers and utilized flakes, as well as faunal materials with butchering marks, may be indicative of animal processing. Ground stone and carbonized plant remains are generally interpreted as evidence of plant processing.

Once site function has been ascertained, sites can be placed within the systemic context of an annual or seasonal round, if the cultural and chronological affiliations are known. This information, in conjunction with ethnographic analogy and ethnoarcheological data, can often be used to develop a settlement model for an area.

Intrasite Patterning

Another goal of the data recovery program was the analysis of artifact distribution within each site to see if localized activity areas could be identified. Several researchers (Binford and Binford 1966; Whallon 1973, 1978) have developed various models for identifying activity areas within a site. Most are based on several premises: that different activities are localized to different portions of a site, that different combinations of tools were used for different activities, that some proportion or representative sample of these tools and their byproducts will be left in situ, and that by analyzing the spatial clustering of various artifact types over an occupation area, different activity areas can be identified.

Technological Analyses

Because lithic debris and tools were expected to be the most common class of artifact, the technological subsystems involved in stone tool manufacture were another problem domain. This analysis was to include the debitage in addition to the tools because formal tools are often "curated," affecting the number and frequency that are incorporated into a site assemblage. Debitage is more likely to remain on the site and can be used to identify the source of the material, manufacturing procedures and, ultimately, site function.

Methodology

Field methodology was the final theme to be addressed by this data recovery project. As excavation costs escalate, new methods and techniques must be developed to aid the archeologist in identifying areas with the greatest potential to yield critical data. One such technique is magnetic surveying, a nondestructive technique that can be used to locate subsurface magnetic anomalies. Such anomalies can be caused by natural agencies such as desert pavement and animal burrowings, but are often the result of cultural features such as firepits, structures, floors and thermally altered rock scatters. Although the applicability and usefulness of this technique had already been proven in other regions (Huggins 1981; Weymouth 1976), the data recovery program for Frontier Pipeline was designed to test its efficacy in sand dune sites in southwestern Wyoming.

Results

The full range of prehistoric occupation from Paleoindian (10,000-6,000 B.C.) through Early, Middle and Late Archaic (6000 B.C.-A.D. 0), to the Late Prehistoric period (A.D. 0-1700) has been identified in southwestern Wyoming (Metcalf and Anderson 1981). Excavations during the Frontier Project revealed a more limited sequence of occupation, from the Early Archaic to the Late Prehistoric periods. Most of the materials, however, date to the Late Prehistoric period.

Three of the six sites, 48UT199, 48UT779 and 48UT370, were multicomponent containing both Archaic and Late Prehistoric occupations. The Austin Wash Site (48UT390) and 48UT445 were only occupied during a single time period--the Late Prehistoric. The temporal affiliation of the sixth site, 48UT377, is unknown.

In general, all of the sites except the Austin Wash Site can be best described as short-term camps used for resource processing and/or procurement. The extensive artifact assemblage at the Austin Wash Site, coupled with the frequency and variety of features, suggests that this location was a longer term habitation site.

Pollen and plant macrofossils from the flotation analysis indicated some utilization of local plant resources. The most commonly occurring charred seeds were strawberry, chenopod, sunflower and peppergrass. The general lack of ground stone, however, suggests that plant processing was not an important activity at any of the sites.

Perhaps the most abundant source of information on subsistence at these sites was faunal remains. The remains of at least 15 antelope were recovered from the bone midden at the Austin Wash Site. This site also produced faunal remains of bison and a variety of other smaller mammals. Limited amounts of faunal remains were recovered from both the Archaic and Late Prehistoric components at 48UT199 and 48UT779.

The analysis of the lithic assemblages from these sites has provided a clear understanding of the tool kit of the Late Prehistoric period in this area of Wyoming. The artifactual material from the Early, Middle and Late Archaic is scant and few inferences can be drawn about the tool kits for these periods.

The debitage analysis demonstrated that most expedient tools, particularly scrapers at the Austin Wash Site, were manufactured on-site from chert and quartzite cobbles locally available in the lag gravels. Several of the more formal tools were made of material that was not immediately available on-site or at least the material was reduced elsewhere. At the Austin Wash Site, the complete lithic reduction sequence was identified. At the other sites, particularly at 48UT370, the later stages of reduction were emphasized.

The results of the magnetometer survey were equivocal. As an experimental technique, it was able to identify several subsurface cultural features, however, the shallow dune deposits, high magnetic content of the bedrock and lack of well developed soil horizons limited the utility of magnetic surveying for this data recovery program. Only about half of the identified anomalies were of cultural origin.

Structure of the Report

The next chapter presents background information on the general environment and culture history of the project area. It is followed by a chapter discussing the field and laboratory procedures for this data recovery program. The next six chapters report the results of the excavations at the Austin Wash Site (48UT390), 48UT199, 48UT779, 48UT370, 48UT445 and 48UT377. Each chapter presents information on the environmental setting, the stratigraphy and cultural features, the artifact analyses, and the summary and conclusions. Following these is a chapter devoted to the research contributions of this project. The final chapter presents a summary of the data recovery program. Two appendices present the results of the pollen analysis and the magnetic survey.

CHAPTER 2

BACKGROUND INFORMATION

To provide a background for interpreting the results of the excavations, this chapter summarizes the environmental setting of the project area and presents a discussion of the culture history of the region.

Environmental Setting

The six excavated sites are located near the Church Butte State Historic Landmark in the southwestern portion of the Green River Basin, southwestern Wyoming. Most of the sites lie in sand dunes situated on fairly level terraces above the Blacks Fork River and its tributaries. One site, the Austin Wash Site, is located on a terrace in a valley bottom in colluvial/eolian sand deposits. The sites lie at elevations ranging from 1935 to 2060 m.

Physiography and Geology

The project area is located in the Green River Basin, the westernmost Basin in a group of intermontane depressions collectively known as the Wyoming Basin (Blackstone 1971). The Wyoming Basin is situated within the Rocky Mountains Physiographic Province midway between the Great Basin and the Great Plains. Because of its transitional location, environmental characteristics from both of these areas are evident.

The Green River Basin is bordered by the Uinta Mountains of Utah on the south, the Overthrust Belt on the west and the Rock Springs Uplift on the east. The northern boundary is located near the headwaters of the Green River and is formed by the Wyoming and Wind River ranges. The project area is located in the southwest portion of the Green River Basin in the vicinity of an erosional feature, Church Butte.

Bedrock exposed within the Green River Basin is primarily Eocene fluvial sandstones and mudstones, and lacustrine algal limestones of the Green River and Bridger formations (Oviatt 1983; Robinove and Cummings 1963). Wind and water have eroded these formations into mesas, ridges, buttes and badland escarpments. The primary drainages within the basin are the south flowing Green River and its tributaries, the Blacks Fork, Henrys Fork and Hams Fork rivers. Stepped series of terraces, separated by escarpments and ridges, also occur along the major drainages. In the

project area, intermittent tributaries to the Blacks Fork River have incised drainage channels across these terraces and escarpments. Alluvial fans are generally present along the base of the escarpments.

The six Frontier sites are situated on the fairly flat terraces above and within 8 km of the Blacks Fork River, the permanent water source for the project area. These terraces are generally composed of lag gravels mixed with clay materials. In many areas, they are covered by stabilized sand dunes from the Church Butte Dune Field, an informal name designated for the purposes of this report. Oviatt (1983), the project's geologist and geomorphologist, reports that "sand grains in the dunes show no evidence of the rounding and surface frosting typical of eolian sands implying that the sand has been wind-transported only a very short distance." He suggests that the dunes are derived from reworked sand eroded from the local Bridger Formation and that eolian deposition is the primary aggradational process in the area (Fig. 3). Thus, it is not surprising that most of the buried cultural materials in the region are found in dunes. All of the sites excavated during this project occur in stabilized sand dunes except the Austin Wash Site, which occurs in colluvial slope deposits mixed with an eolian sand component (Oviatt 1983).

Throughout the Green River Basin, sand dunes along the terraces (Fig. 4) appear to be favored localities by prehistoric populations (Love 1977). For example, cultural material occurs in almost every sand dune along the terrace for over 5 km near 48UT199. Oviatt (1983) speculates that the wide variety of plants and animals found in the dunal areas, in contrast to the hard, rocky and generally unvegetated alluvial flats, may have made them more attractive to the prehistoric inhabitants.

The sources for most of the lithic materials from the six excavated sites are cherts and quartzite cobbles, found in the widespread lag deposits, and tabular chunks that occur in both the desert pavement and on the scarps and ridges surrounding the sites. The lacustrine Eocene formations in the Green River Basin contain cherts with a wide variety of textures and colors. Pleistocene erosion has scattered and mixed material from this source and a number of other primary sources over most of the river terraces and benches in the project area (Love 1977:22).

Several different cherts are available in the project area, Tiger, Whiskey Buttes and Granger Green. The primary source of the Tiger chert appears to be in the vicinity of Pine Spring (Sharrock 1966). The distinctive brown and white opaque microcrystalline silicate called Whiskey Buttes chert is found in outcrops immediately southeast of Whiskey Buttes. "In situ" layers and lag cobbles of the opaque green chert, Granger Green, are found in the vicinity of Church Butte (Love 1977:24).

The prehistoric inhabitants also produced stone tools from the quartzite cobbles that are common in the desert pavement on the terraces between the sand dunes. Obsidian, although found only in limited quantities during this project, occurs as pebbles in the lag gravels on many of the terraces in the southern portion of the Green River Basin (Love 1977).

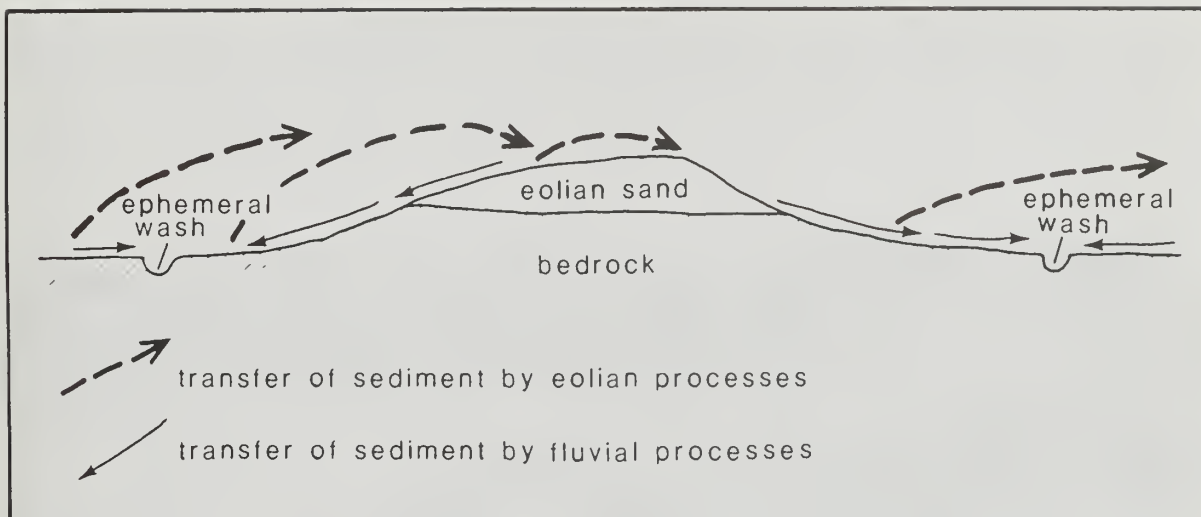


Fig. 3. Diagram of the deposition/erosion cycle in the Church Butte Dune Field, Wyoming.

Climate

The climate of the project area is arid to semiarid. Average annual precipitation is approximately 20 to 25 cm per year, with higher amounts in the surrounding mountains. Most of the rainfall occurs during the spring and early summer. The area is characterized by warm, short summers with little precipitation and long, cold winters with fairly heavy snowfall. Snow cover averages approximately 90 days per year. The mean temperature is about 22° C in July and -10° C in January (Becker and Alyea 1964). Strong westerlies, which substantially lower the measured temperatures, blow almost continually. The average growing season in the Green River Basin is approximately 110 days, but length varies depending on altitude (Robinove and Cummings 1963).

Vegetation

The vegetation of the Green River Basin consists of species typical of the Upper Sonoran and Transitional life zones (Cary 1917). Upper Sonoran vegetation covers most of the valleys and lower benchlands and primarily consists of mixed desert shrub communities. The species composition of this zone is similar to that of the pinyon-juniper belt in the Great Basin, though with less variety. Scattered pinyon occurs only in the southern portion of the Green River Basin on ridges in the foothills of the Uinta Mountains. Juniper and mountain mahogany are present throughout the Basin on the higher scarps and ridges (Cary 1917). At higher altitudes, the



Fig. 4. Typical environment in general project area, Uinta County, Wyoming.

Upper Sonoran Zone gradually grades into the Transition Zone. Taxa characteristic of the Transition Zone in this area includes sagebrush, juniper and other conifers. Sagebrush covers wide expanses of the Transition Zone, with pines being primarily restricted to the lower mountain foothills (Cary 1917).

The sites excavated during this project are presently situated in the Upper Sonoran Life Zone, primarily within a Mixed Desert Shrub community. Vegetation is relatively dense in the sand dune areas and other sandy surfaces of the upland terrace benches. Big sagebrush (Artemisia tridentata) is the most common taxa in these areas. Other less common shrubs include shadscale (Atriplex confertifolia), rabbitbrush (Chrysothamnus spp.), other species of saltbush (Atriplex spp.), budsage (Artemisia spinescens), greasewood (Sarcobatus vermiculatus), spiny hopsage (Grayia spinosa) and spiny horsebrush (Tetradymia spinosa). The sparse cover of grass between the shrubs includes Indian rice grass (Oryzopsis hymenoides), wheat grass (Agropyron spp.), Salina wild rye (Elymus salina), needle-and-thread grass (Stipa comata) and bottlebrush squirreltail (Sitanion hystrix). Among the numerous forbs scattered between the shrubs are bee weed (Cleome lutea), veiny dock (Rumex venosus), buckwheat (Eriogonum spp.), phlox (Phlox spp.) and penstemon (Penstemon spp.). Prickly pear cactus (Opuntia polycantha) is also found in the dunal areas.

The vegetation is more sparse and less varied in the clayey soils of the desert pavement surrounding the dunes. Saltbush is the most common shrub with sagebrush only rarely present. Sparse patches of grasses as well as forbs such as biscuitroot (Cymopterus bulbosus) also occur on these clayey soils. Along the major intermittent drainages, greasewood and sagebrush are the predominant taxa. The badland escarpments and the alluvial fans located at their bases are generally barren. Riparian communities consisting of cottonwoods (Populus spp.) and willows (Salix spp.) are present in small pockets along the Blacks Fork River.

Many of the plant species in the vicinity of the project area probably were utilized by the prehistoric inhabitants. Ethnographically, shrubs such as saltbush and sagebrush provided seeds that were parched in winnowing baskets and stored for the winter (Chamberlin 1911; Steward 1938). Seeds from grasses including wild rye and Indian rice grass were used by the Shoshoni and Great Basin Indian groups. Leaves, roots and seeds of a number of different forbs found throughout the project area were probably also important plant foods. At the Eden-Farson site, Frison (1971) found seeds of silver berry (Eleagnus commutatus), saltbush (Atriplex sp.) and lambs quarter (Chenopodium sp.) and pigweed seed cakes (Amaranthus retroflexus) in many of the Protohistoric Shoshonean lodges. The numerous pieces of ground stone recovered from some archeological sites in the Green River Basin indicate that the processing of plant foods was a major economic activity at some sites, at least during some prehistoric periods (Armistage et al. 1982; O'Brien et al. 1982).

Animals

Of the large mammals, pronghorn antelope (Antilocapra americanus) is the most common in the area today. Prehistorically, pronghorn was an important food as attested by their remains in many archeological sites. In addition to the Austin Wash Site, excavated during this project, sites in the Green River Basin that contain evidence of extensive antelope utilization include Eden-Farson (Frison 1971), Oyster Ridge (Zier 1982), Firehole Basin 11, Boars Tusk and Galiun (Reiss and Walker 1982). Ethnographically, antelope were usually hunted by large groups of Indians who drove the antelope into brush corrals (Steward 1938).

Bison (Bison sp.) were probably also present in the project area at one time, although they were evidently more numerous in other portions of Wyoming. Large bison traps or butchering sites in the Green River Basin include the Finley site (Moss et al. 1951), a Cody Complex site near the Killpecker Dunes, and the Late Prehistoric Wardell site (Frison 1973) located near Big Piney.

Other mammals that presently inhabit the project area include mule deer (Odocoileus hemionus), least and rock chipmunks (Eutamias minimus, E. dorsalis), Richardson's ground squirrel (Spermophilus richardsonii), long-tailed weasel (Mustela frenata), white-tailed prairie dog (Cynomys leucurus), montane vole (Microtus montanus), badger (Taxidea taxus), Green River pocket gopher (Thomomys talpoides), striped skunk (Mephitis mephitis), coyote (Canis latrans), white-tailed jackrabbit (Lepus townsendii) and cottontail (Sylvilagus sp.) (Long 1965). Remains of many of these mammals have been recovered from archeological sites in the area (Armitage et al. 1982; O'Brien et al. 1982). The use of several mammalian species, including mule deer, rabbits and various rodents, are discussed in the ethnographic sources (Lowie 1924; Steward 1938). Among these mammals, rabbits were highly prized for their meat and fur and were hunted in communal drives.

Sage grouse (Centrocercus urophasianus) is the most prevalent game bird in the Green River Basin. Evidence of its use during prehistoric times comes from Deadman Wash (Armitage et al. 1982). According to Cary (1917), a number of other birds breed in the Upper Sonoran and Transition zones including the magpie (Pica pica), green-tailed towhee (Chloeuva chloeuva), sage sparrow (Amphispiza nevadensis) and brewer sparrow (Spizella breweri) among others. Migratory water fowl frequent areas of standing water during some seasons.

Steward (1938) states that reptiles also were eaten during ethnographic times when they were sufficiently abundant. Reptiles occurring in the project area include eastern short-horned lizard (Phrynosoma douglassi) and the northern sagebrush lizard (Sceloporus graciosus). In addition to animals, birds and reptiles, there is some evidence that human populations in the area also utilized insects. At the Eden-Farson site, Frison (1971:261) found charred fragments of Mormon crickets (Anabrus simplex), large red ants (Pogonomyrmex sp.) and other insects mixed with seed cakes.

Culture History of the Region

The human occupation of southwestern Wyoming began as early as 12,000 years ago and has continued up to the present. Prehistorically, four cultural stages/periods are represented: Paleoindian, Archaic, which can be subdivided into three periods, Early, Middle and Late, Late Prehistoric and Protohistoric (Shoshoni). Recorded history in the area begins with John Jacob Astor's expedition in 1812. This expedition was later followed by other explorers, geologists, fur traders, Mormon pioneers, and later, cattle barons and coal miners.

Background

Surprisingly, some of the earliest archeological exploration in southwestern Wyoming was conducted in the Church Butte area in the 1930s. Based on his surveys in the area, E. B. Renaud postulated the first regional cultural chronology for the Wyoming Basin (1936, 1938, 1940, 1947). Renaud identified three prehistoric occupations in the area which he labelled the Typical, the Peripheral and the Sand Dune cultures.

The Typical Culture was characterized by pebble tools, cobble tools, hand axes ("coups de poing") and "Clactonian" flakes. Artifacts of this culture often had heavily polished surfaces dulling the flake scars. The spatial distribution of this culture was very restricted--it was limited to a few miles of terraces along the Blacks Fork River between Lyman and Church Butte.

According to Renaud, the Peripheral Culture was located south of the Blacks Fork River and was contemporaneous with the Typical Culture. In this area, similar artifact classes were found but were manufactured of chert rather than quartzite. Renaud used wind polish, degree of patinization and resemblance of artifacts to specimens of the Early and Middle Paleolithic in Europe as evidence of great antiquity for both the Typical and Peripheral cultures. An antiquity of 30,000 to 40,000 years ago was proposed for these two prehistoric occupations.

The Sand Dune Culture was the name that Renaud gave to his third, reputedly much younger, prehistoric occupation. This culture was defined by sharp, unweathered flakes, one-hand manos, grinding slabs, finely chipped bifaces, projectile points and the presence of firepits.

Even Renaud (1940:91) recognized some serious flaws with his chronology of the region. All of the artifacts of the Typical and Peripheral cultures were surface finds; Renaud was unable to locate any buried components from these occupations, components which he expected to produce Pleistocene fauna.

Other problems with this chronology include the fact that many of the "artifacts" from the early cultures are naturally occurring ventifacts. Additionally, flakes, bifaces and "hand axes" ascribed to the Blacks Fork

Typical and Peripheral cultures are also found on sites attributed to the Sand Dune Culture. Recent research (e.g., Sharrock 1966) has demonstrated that the bulk of the flaked artifacts from these reputed early cultures do not represent crude hand axes and flake implements, but are more parsimoniously interpreted as remnants of lithic reduction stages, e.g., cores, blanks and preforms, instead of paleolithic tools.

Researchers, today, discount Renaud's chronology for the area and use chronologies from either the Great Basin or the Plains. The use of these chronologies is based on a tacit assumption that because the environment of the Wyoming Basin is peripheral and transitional from a Great Basin desert to a Plains steppe that the cultural manifestations encountered in the area will also be peripheral and transitional to those of the Great Plains and Great Basin culture areas. Whether or not this assumption is valid, it was not until the mid-1950s that chronologies were developed for either the Great Basin or the Plains.

In the mid-1950s, Mulloy presented the first useful chronology for the Northwest Plains based on a number of excavated sites in the region (Mulloy 1958). This chronology included an Early Prehistoric period, a Middle Prehistoric period and a Late Prehistoric period. The chronology had a 2000-year occupational hiatus from about 7500 to 5000 years ago. During this hiatus, referred to as the Altithermal period, the Plains were thought to have been too warm and dry to support human habitation, and when Mulloy developed this chronology, there were no known sites that dated to the Altithermal period.

Later, Wedel (1961, 1978) and most recently, Frison (1978), revised this chronology slightly. Frison changed the name of the Early Prehistoric to Paleoindian period, and divided the Middle Prehistoric period into three sequent subperiods, the Early, Middle and Late Plains Archaic. The Early Plains Archaic coincides with the 2000-year occupational hiatus in Mulloy's scheme. The Late Prehistoric period was not altered.

Although Frison's chronology is widely applied in the Wyoming Basin, it must be remembered that the chronology is better established for the Northwest Plains. Frison's discussion of chronology for southwestern Wyoming is based on only seven sites (Frison 1978).

Another cultural chronology used in southwestern Wyoming is derived from the Eastern Great Basin and Utah, and is presented by Jennings (1978). The earliest two divisions of this chronology consist of merely cultural stages, the Lithic stage and the Archaic. The Lithic stage is coincident with the Plains Paleoindian period. The Archaic has a similar time span as the Plains Archaic stage presented by Frison, although the subsistence pattern is completely different. Jennings presented the Fremont, a formative stage culture, as the last major prehistoric occupation of the northern Colorado Plateau. The Fremont temporally correspond to the Late Prehistoric period on the Plains.

Recently a new chronology was proposed specifically for the Wyoming Basin by Metcalf (1982). Using radiocarbon dates in much the same manner

as Schroedl (1976), Metcalf divides the prehistory of the Wyoming Basin into Paleoindian, Early and Late Archaic periods and a Late Prehistoric period. Each of the last three periods is divided into two phases corresponding to fluctuations in frequencies of radiocarbon dates.

Generally, this scheme conforms temporally with that of Frison (1978). Metcalf's Early Archaic coincides roughly with Frison's Early Plains Archaic, and is divided into the Great Divide and Green River phases. Metcalf's Pine Springs and Deadman Wash phases roughly correspond to Frison's Middle and Late Plains Archaic. Both Frison and Metcalf agree on the temporal span of the Late Prehistoric while Metcalf divides this period into the Uinta Phase (A.D. 200 to 500) and the Firehole Phase (A.D. 1000 to 1700).

Unfortunately, Metcalf's chronology is not very useful. The chronology is based solely on the frequency distribution of radiocarbon dates without regard for concurrent shifts in technology, subsistence and settlement. The result is a series of temporal units that have no corresponding diagnostic artifact types, features or subsistence patterns. While Metcalf's chronology may not be useful, it serves a purpose of reminding researchers that a tremendous amount of data has been recovered in the past decade in the Wyoming Basin, enough that serious chronologies based on substantive data can now be attempted.

Based on these previous chronologies for the region and surrounding areas, and the data recovered during this project, we are proposing a new temporal sequence for southwestern Wyoming. Unlike Metcalf's chronology which relies solely on radiocarbon dates, this proposed sequence is based on changing artifact types and subsistence patterns between periods.

Cultural Chronology for Southwestern Wyoming

For the most part, the proposed chronology closely follows those previously developed for surrounding areas. The time spans for each of the six periods, Paleoindian, Early Archaic, Middle Archaic, Late Archaic, Late Prehistoric and Protohistoric, are presented in Table 1. For each period, diagnostic artifacts and features are presented below. Further details on hypothesized subsistence patterns for each temporal period are also discussed.

Paleoindian Period

Although no firm beginning date can be identified for this period, most Paleoindian researchers assign a beginning date of about 10,000 B.C. for classic Paleoindian occupation on the Plains. A terminal date for Paleoindian in southwestern Wyoming is set at 5000 B.C. This date is derived primarily by negative evidence, since few Paleoindian occupations have been excavated in the area. Because the first evidence of Archaic occupation in the region dates to about 5000 B.C., this date is taken as the start of the Archaic and the end of the Paleoindian period.

Table 1. Temporal designations and time spans.

Temporal Periods	Time Span
Paleoindian	10,000 B.C.(?) - 5000 B.C.
Early Archaic	5000 B.C. - 3000 B.C.
Middle Archaic	2500 B.C. - 500 B.C.
Late Archaic	500 B.C. - A.D. 150
Late Prehistoric	A.D. 150 - A.D. 1300
Protohistoric	A.D. 1300 - Historic times

Excavated sites in the region that have produced evidence of Paleoindian occupation include the Pine Springs site (Sharrock 1966) and the Finley site (Moss 1951). The Pine Springs site produced several diagnostic Paleoindian projectile points and early radiocarbon dates. Unfortunately, the deposits at the site were mixed and cultural temporal associations of the artifactual material are uncertain. The Finley site, excavated in the 1940s, is the most thoroughly excavated and reported Paleoindian site in southwestern Wyoming. The site, a kill site for a now-extinct species of bison, dates to about 7000 B.C. and contains both Eden and Scottsbluff points.

Paleoindian sites are distinguished by two major criteria, Pleistocene megafauna and distinctive finely flaked projectile points. Frison (1978) presents an extended discussion of a variety of Paleoindian complexes of the northwest Plains, each represented by distinctive projectile points such as Clovis, Folsom, Agate Basin, Hell Gap, Alberta, Pryor-stemmed, Lovell Constricted and others. In southwestern Wyoming, Paleoindian period occupation is documented primarily by surface finds.

The diagnostic Paleoindian points indicate that prehistoric occupation in the region has affinities to the Plains Paleoindian occupation, because no unequivocal Paleoindian occupations with distinctive point types have been identified in the Great Basin or Northern Colorado Plateau to the west and south of the Wyoming Basin.

Although prehistoric occupation in the Great Basin and Northern Colorado Plateau is evident as early as 8000 B.C. at Danger Cave (Jennings 1957), 6400 B.C. at Hogup Cave (Aikens 1970) and 6300 B.C. at Sudden Shelter (Jennings et al. 1980), none of these occupations represent an adaptation to the hunting of big game with specialized or unique dart points. These early occupations appear to represent a hunter-gatherer foraging economy accompanied by distinctive dart points different from the finely flaked classic Paleoindian points of the Plains. Thus, the limited evidence for southwestern Wyoming suggests that occupants of the region during the Paleoindian period focussed on the hunting of large game animals,

particularly bison, and the manufacturing of a wide range of distinctive projectile points. These groups were more likely affiliated with Plains oriented Paleoindian cultures.

Early Archaic

The Early Archaic period begins about 5000 B.C. and lasts until about 3000 B.C. The earliest excavated Archaic occupation in southwestern Wyoming is at the Maxon Ranch site (48SW2590) (Gardner, Tanner et al. 1982). This site contained a number of scattered features and a variety of diagnostic projectile points dating from the Archaic, Late Prehistoric and Protohistoric periods. The presence of ground stone artifacts and a series of radiocarbon dates suggest this location was repeatedly occupied during the Archaic and later periods. One of the features produced a radiocarbon date of almost 5300 B.C., but the feature was not associated with a discernible occupational horizon. Outside of suggesting Archaic occupation in the area as early as 5300 B.C., the dated feature is of little interpretive value.

Extant Early Archaic occupations are not well represented in the prehistoric chronology until about 500 years later. Both Deadman Wash (Armitage et al. 1982) and 48UT372 (Metcalf and Anderson 1982b) have Archaic occupations dating to about 4800 B.C. Deadman Wash contained more evidence than 48UT372 of Early Archaic occupation in the region. Component 3 at Deadman Wash, which produced three radiocarbon dates ranging from 3500 to 4800 B.C., contained a variety of features, including firepits and postholes and a number of ground stone artifacts.

Other dated Early Archaic components were excavated at 48UT375 (Metcalf and Anderson 1982b), 48CR3961 (O'Brien, Gardner et al. 1983), 48UT370 (this report), 48SW4491 (Creasman et al. 1983), and 48SW1900 and 48SW5019 (Reust et al. 1982). In general, these components represent single short-term episodes of Early Archaic occupation in the region. Usually only a few features are present and there is only limited subsistence evidence. A variety of named Great Basin projectile point types are diagnostic for this period (Holmer 1978), including the Northern side-notched (Bitterroot side-notched), Rocker Base side-notched, Sudden side-notched and Hawken side-notched. Diagnostic point types from the Plains (Frison 1978) include the Blackwater side-notched, Pahaska side-notched and Hawken side-notched. Further analysis of several of the Great Basin and Plains point types may demonstrate that they are isomorphic and should probably be subsumed under one named type (Schroedl 1980). The defining characteristic of almost all diagnostic point types of this period is a relatively high side-notch. Besides projectile points, large, side-notched knives are also considered diagnostic of the Early Archaic (Creasman 1983).

The Early Archaic period roughly coincides with the Altithermal period as defined by Antevs (1948, 1955). Antevs describes the Altithermal as a period of increasing temperature and xeric climatic conditions which resulted in a reduction of available forage, carrying capacity and decreased populations of large herbivores. Thus, it is postulated that in

southwest Wyoming during the Early Archaic period, the subsistence base shifted from the exploitation of large mammals to a balanced utilization of wild plant resources and small mammals (Armitage et al. 1982).

Middle Archaic

The Middle Archaic period, dating from roughly 2500 to 500 B.C., coincides with a return of mesic climatic conditions in southwest Wyoming. Subsistence strategies continued to be a balanced economy of hunting and gathering (Armitage et al. 1982). Technological changes in this period include the appearance of lanceolate and stemmed projectile points, often with indented bases. A distinctive feature type, the vertical sandstone slab-lined pit, is associated with this period (O'Brien, Gardner et al. 1983, O'Brien, Tanner et al. 1983).

The Middle Archaic is distinguished in southwestern Wyoming by the presence of McKean Lanceolate, Duncan, Hanna, Yonkee and Mallory points, all identified as Plains point types, often associated with bison procurement sites (Frison 1978). Great Basin point types from this period that are similar to Plains types include Elko, San Rafael side-notched and McKean points (Holmer in Jennings et al. 1980).

While a variety of dated features and isolated activity areas have been excavated from this period, extensive assemblages and feature complexes have yet to be well documented. Sites with components from this period include 48CR2200 (Creasman et al. 1983), 48UT199 (this volume), the Pine Springs site (Sharrock 1966) and Cow Hollow Creek (Mackey et al. 1983).

It is during the Middle Archaic that elaborate burial practices seem to originate. Millar (1981) discusses such practices including the use of red ochre in the burial procedures. Metcalf et al. (1981) describe an apparent Middle Archaic burial at 48UT63 with three ochre-stained milling stones that date to about 3000 B.C.

Late Archaic

The subsistence strategies during the Late Archaic, dating roughly from 500 B.C. to A.D. 150, are similar to those in the Middle Archaic. Although the Late Archaic is characterized by the introduction of medium-sized, corner-notched points such as Pelican Lake, Besant (Frison 1978) and Elko series, the transition from Middle Archaic to Late Archaic is not clearly defined. It could be argued that these two periods (Middle and Late Archaic) represent phases in the post-Altithermal cultural development within southwest Wyoming rather than distinct cultural periods (Zier et al. 1983).

No Late Archaic occupations were identified during this project, although Late Archaic components are known from the area. At Deadman Wash

(Armitage et al. 1982), Component 7, a Late Archaic component, produced five radiocarbon dates ranging from 700 to 100 B.C. and a wide range of features and artifacts.

The diagnostic points of this period are probably the least distinctive of all the prehistoric periods in the Wyoming Basin. The corner- and side-notched points are usually crudely made and seem to represent a variety of different types. The side-notched points are smaller and have lower side notches than side-notched points from the Early Archaic period. Points from this period could be assigned to the Pelican Lake series, a northwest Plains type (Frison 1978) or to the Elko series, a Great Basin type (Holmer 1978).

Late Prehistoric

The Late Prehistoric period (cf. Metcalf 1982) begins about A.D. 150 and continues until about A.D. 1300. The bulk of the dated and excavated components in southwestern Wyoming fall into this period. The occupation during this period seems to be extensive and may be the result of favorable climatic conditions during this period. Point types in this period may include both the Pelican Lake and Elko series in the early part of the period, with Besant points representing the later notched points.

However, the most distinctive diagnostic point type of this period is the Rose Springs point (Holmer and Weder 1980). This small point type represents the introduction of the bow and arrow into southwestern Wyoming around A.D. 500. Rose Spring points and/or radiocarbon dates of the Late Prehistoric period were recovered at four sites on this excavation project, the Austin Wash Site, 48UT199, 48UT779 and 48UT445. The 1983 excavation data, coupled with existing data, provides a firm foundation for postulating a subsistence pattern for this time period (see Chapter 10).

Pottery and a crudely made side-notched arrow point are also found during this period. Although no detailed analyses have been conducted, the pottery could be Fremont and the small side-notched point may represent Uinta side-notched points which are diagnostic of the Uinta Fremont in northeastern Utah.

Although a balanced hunting and gathering subsistence strategy is thought to have continued into this period (Armitage et al. 1982), some evidence of horticulture is also present in the Canyon Pintado Historic District (Creasman 1981) and the Uinta Basin on the Colorado Plateau adjacent to southwest Wyoming (Jennings 1978). Although the short growing season in southwestern Wyoming would probably be prohibitive for horticulture, Fremont influence, in the form of pottery and petroglyphs, has been noted at Irish Canyon and along the Green River (Day and Dibble 1963).

Protohistoric

The Protohistoric period in southwestern Wyoming dates from about A.D. 1300 until historic times. While most researchers have included this period as a phase of the Late Prehistoric, there seems to be a distinct cultural difference between the Late Prehistoric and Protohistoric periods. The presence of Shoshoni pottery and Desert side-notched points, also referred to as a "tri-notch" points, mark the arrival of Numic speaking Shoshoni Indians into the region.

Pottery dating to after A.D. 1300 is most likely Shoshoni rather than Fremont. The Desert side-notched points are extremely accurate time markers in the Great Basin and date to after A.D. 1300 (Thomas 1981). Holmer and Weder (1980) have shown statistically that these points are associated with Shoshoni occupations rather than Fremont.

Besides the ceramics and projectile points, communal hunting appears to be another diagnostic trait of the period. At the Boars Tusk site, the Firehole Basin 11 (Reiss and Walker 1982) and Eden-Farson site (Frison 1971), large antelope kill/processing sites were associated with Shoshoni ceramics and small Desert side-notched points. At least one post-contact Protohistoric antelope kill site, "Natural Trap", has been identified which contained corals, metal projectile points, glass beads, as well as Shoshoni ceramics and Desert side-notched points. Thus, the Protohistoric is clearly associated with the incursion of Shoshoni into southwestern Wyoming.

CHAPTER 3

FIELD AND LABORATORY METHODS

This chapter describes the field techniques and laboratory methods that were used to recover and analyze the data from the Frontier Pipeline excavations. The field and laboratory procedures were standardized for all of the sites to facilitate interpretation and comparison of the data.

Field Methods

The datum, designated 100 North, 100 East, was located on the southwestern edge of each site. A 1 by 1 m grid system, oriented towards magnetic north, was then superimposed over each site to provide horizontal control. Magnetic north was used instead of true north to aid in interpreting the results of the magnetic survey.

Individual excavation units were designated by the coordinate of the southwest corner of the 1 by 1 m grid unit. Vertical control was maintained in relation to a location established on the highest point of the site; this point was arbitrarily assigned an elevation of 100 m. Each site was mapped in 1 m intervals using a transit. These maps depict the local topography and identify the location of site boundaries, cultural features, datums, including those from previous investigations, as well as all excavation units.

The location of the initial excavation units was based on the results of the magnetometer survey, previous investigations and the presence of exposed cultural phenomena. Subsequent units were positioned to expose features, activity areas and stratigraphy noted during the early phases of the work. The excavations were conducted in 1 by 1 m square units using shovels and trowels, as appropriate. Fill was removed in 10 cm levels until cultural stratigraphy could be established, at which time, excavation continued by cultural strata rather than arbitrary levels. All excavated deposits containing cultural materials were screened through 1/8 or 1/4 in (3 or 6 mm) mesh. Artifacts and all other archeological materials were collected and bagged separately by excavation level and 1 by 1 m unit. Notes, maps, profile drawings and photographs were used to document the excavation process.

Upon initial discovery, the horizontal extent of each feature was immediately determined. Features were then sectioned by removing approximately half of the fill and were then profiled. The remaining fill was

removed and sampled for pollen, flotation and radiocarbon analyses. The fill was generally screened through 1/8 in (3 mm) mesh. All cultural features were mapped and photographed.

The geologic investigations conducted during the fieldwork consisted of geomorphic mapping and stratigraphic description. The latter included descriptions of the lithology, bedding, color and thickness of the various strata. Soil and sediment samples were also collected for appropriate laboratory analyses. To address the problem domain concerning subsistence, bulk matrix samples were collected for flotation from features and selected locations throughout the various cultural zones. Pollen and radiocarbon samples were collected from features and other contexts as appropriate.

A backhoe was used at four of the sites to excavate trenches within the construction right-of-way to determine if there were any additional subsurface cultural deposits outside the main excavation areas. The backhoe excavations were monitored by an archeologist for cultural material.

Prior to the excavations, a magnetic survey was conducted at each of the six sites to identify subsurface magnetic anomalies that might be of cultural origin. The magnetometer survey was conducted in 20 by 20 m blocks subdivided into 1 m measuring units using two Geometrics proton precession magnetometers. One magnetometer remained stationary and was used to monitor diurnal fluctuations in the earth's magnetic field. The other instrument was used to take the readings within the 20 by 20 m block. The results of the magnetic survey were portrayed on computer-generated, isopleth maps used to guide excavations of the magnetic anomalies.

Laboratory Methods

More than 20,000 artifacts and ecofacts were recovered from the excavation of these sites. Because of the open nature of the sites, no perishable artifacts or tools were recovered, although some charred seeds and plant remains were collected from the features. Following the completion of the fieldwork, all recovered materials were taken to the laboratory in Salt Lake City for processing and analysis.

The artifacts were washed, organized and sorted into general categories, and then cataloged and assigned University of Wyoming accession numbers. Tools were individually accessioned while other artifacts and faunal materials were accessioned by excavation unit. Artifacts, faunal materials and samples for pollen, flotation and sediment analyses were given to the specialist responsible for their analyses. Discussions of the results are presented on a site-specific basis in the following chapters. Artifacts are presented by descriptive categories of material--flaked stone, pecked and ground stone, and worked bone. The procedures for analyzing these categories are described below.

Flaked Stone Analysis

The flaked stone artifacts from these sites have been produced by means of a bifacial reduction technology. Sequential stage models have been developed which vary in number of stages defined and descriptive terminology (Callahan 1979; Holmes 1919; Muto 1971; Sharrock 1966; Womack 1977). Basically, all involve acquisition of raw material and sequential reduction through increasingly refined bifacial forms. Each stage is represented by characteristic products and byproducts. We have developed a similar bifacial reduction model for the description of flaked stone artifacts (Table 2; Figure 5). While this model applies primarily to the bifaces and debitage, it is broadly descriptive of the production of most of the flaked stone tools.

The model is, of course, a generalization tracing the production of an idealized product. Variations of the scheme are possible and, in fact, necessary for the production of certain kinds of tools. For example, the products of reduction, waste flakes, may be put directly to use, modified and used, or discarded at any stage. Obvious results of this process are scrapers made on large flakes, finely formed bifaces, notched or unnotched, used as knives, and the use and modification of debitage. Other variation may be provided by the re-entry of discarded items into the main sequence and subsequent modification; a tool may be rejuvenated or its morphology and function changed after use or breakage resulting in the production of waste flakes indistinguishable from other byproducts.

The debitage was initially sorted by raw material type. Additionally, all or a sample of the flakes, depending on the size of the collection, were sorted into size categories (Fig. 6). Finally, each flake was assigned to one of the reduction categories.

The remaining flaked stone artifacts were sorted into formal descriptive types based primarily on morphology, e.g., scraper, graver, drill. The intent was to provide easily recognizable and comparable classes rather than to imply specific, exclusive functions. In the case of projectile points, evidence of basal modification for hafting was required for inclusion in the category. Thus, tips and midsections were grouped with preforms.

Faunal Analysis

Faunal remains were recovered at all of the sites except 48UT377. Most of the recovered bones were from mammals and were identified using the University of Utah Archeological Center's comparative osteological collection. Bone specimens from taxa not represented in the comparative collection were identified using comparative osteological guides (e.g., Gilbert 1973; Olsen 1960; Schmid 1972). The following specimen attributes were recorded during analysis: representative taxon, anatomical element,

Table 2. Classification categories for debitage analysis.

Debitage

Decortication Flake

Platform preparation: None, platform is usually cortex

Size/shape: Large, thick, angular and often blocky

Cross-sectional shape: Irregular and angular

Cortex: Present on all or most of the dorsal surface

Dorsal surface: No previous flake scars present, cortex always present

Purpose: Removal of cortex to expose interior of the stone and removal of the unusable mass

Comments: Usually too angular for further reduction, usually removed by percussion

Other references: Primary decortication flake, primary flake

Initial Reduction Flake

Platform preparation: None, previous flake scar or abrading

Size/shape: Large, thick and angular but more uniform than decortication flake

Cross-sectional shape: Irregular, but thinner and more uniform than decortication flakes, usually curved from the proximal to the distal end

Cortex: Present on a portion of the dorsal surface

Dorsal surface: Decortication flake scars present on the dorsal surface, cortex present on a portion of the surface

Purpose: Further removal of exterior cortex and/or unwanted mass and irregular protusions

Comments: Generally removed by percussion

Other references: Secondary decortication, secondary flake

Primary and Secondary Thinning Flakes

Platform preparation: Usually previous flake scar or abrading, but occasionally none

Size/shape: Medium to small, moderately thin to thin flakes, often longer than they are wide. Primary thinning flakes are larger than secondary.

Cross-sectional shape: Uniform and moderately thin to thin in cross section, and moderately to slightly curved from the proximal to the distal end

Cortex: Rarely present and only in small amounts

Dorsal surface: Previous flake scars evident on the dorsal surface, two or more relatively parallel arises often present

Purpose: Initially, thinning of a flake blank or a core with the intent of producing a tool, followed by further reduction and thinning of the tool

Comments: Can only be produced by direct freehand percussion

Other references: Interior flake, tertiary flake, sharpening flake, thinning flake

Table 2. Continued.

Final Shaping Flake

Platform preparation: Abrading almost always present
Size/shape: Small, thin flakes, longer than they are wide
Cross-sectional shape: Thin and slightly curved
Cortex: Very rarely present
Dorsal Surface: Often only one ridge on dorsal surface
Purpose: Thinning, sharpening or resharpening the edge of the tool
Comments: Generally produced by pressure flaking, usually have a small bulb of force
Other references: Finishing flake, resharpening flake, secondary retouch flake, pressure retouch flake

Indeterminate

Flakes that do not exhibit enough morphological characteristics to be placed in a particular reduction category.

Shatter

Shatter is material on which flake morphological characteristics are not present.
Other references: Chunks, detritus

Bifaces

Blanks

Plan-section: Ovate, leaf-shaped, subtriangular
Cross-section: Plano-convex to biconvex
Technique: Removal of overlapping percussion thinning flakes from periphery
Comment: Blanks may vary from crudely shaped roughouts to finely finished forms.

Preforms

Distinguished from blanks by smaller size, thinner cross section and scars from final shaping. They may lack only basal modification to become projectile points or may have been the intended product.

portion of element, side of body, age (based on degree of epiphyseal closure), length, presence of butchering marks and their location, presence of burning and degree of weathering following Behrensmeyer (1978).

Bone specimens are identified to genus or species when possible. Specimens that could not be identified to genus or species are identified to broader taxonomic categories. Nondiagnostic mammal bones smaller in size than jackrabbit are classified as "small mammal." Mammal bones ranging in size from jackrabbit to coyote are classified as "medium mammal." Mammals larger than coyote are classified as "large mammal."

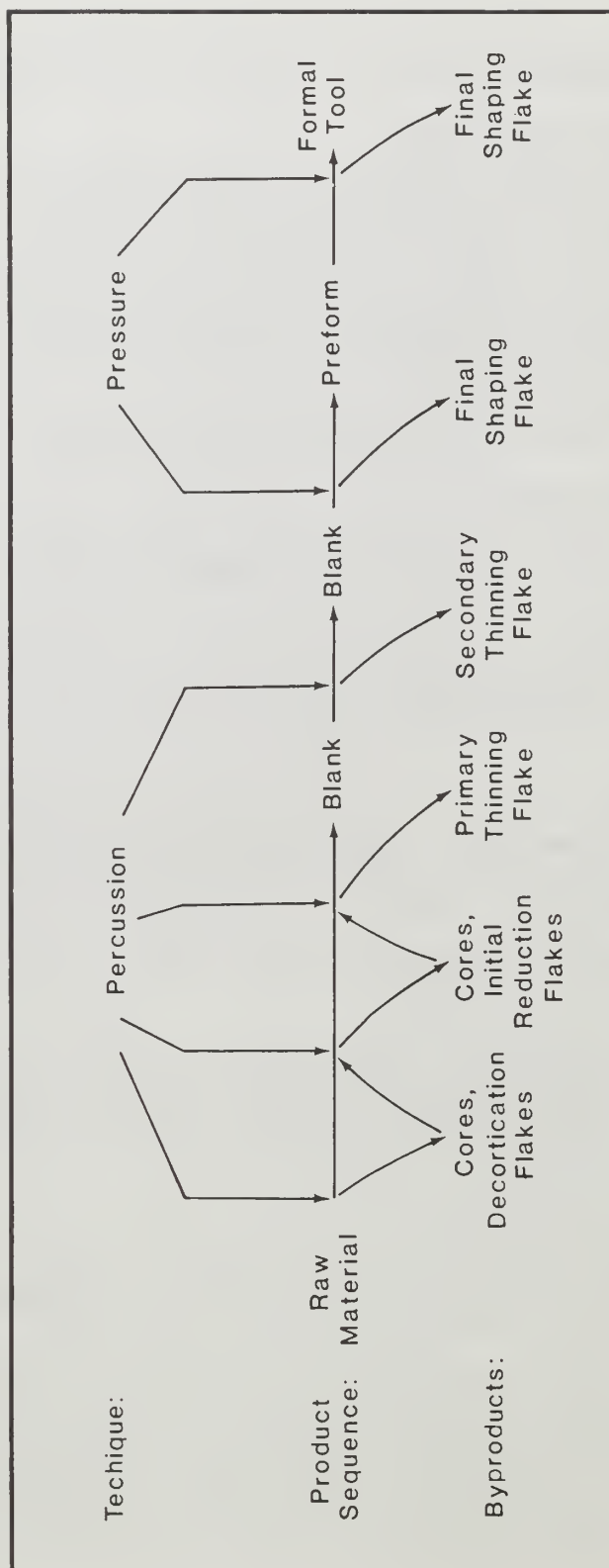


Fig. 5. Bifacial reduction model.

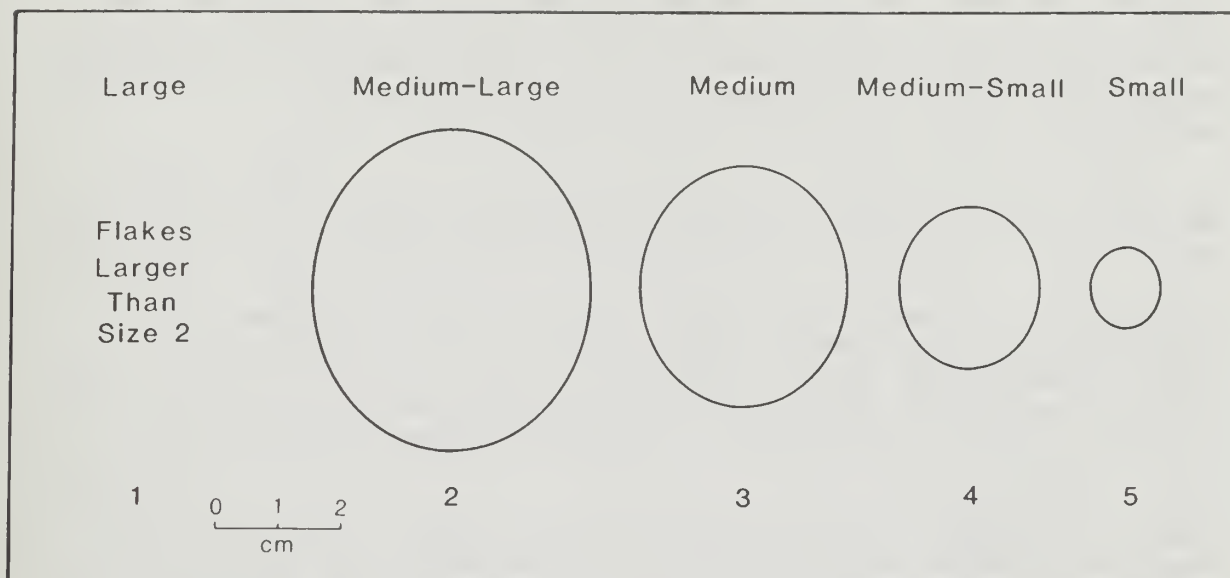


Fig. 6. Flake size sorting categories.

Two measures of taxonomic abundance are employed in this analysis, number of identified specimens per taxon (NISP) and minimum number of individuals (MNI). Both should be considered ordinal scale (rank order) measures of taxonomic abundance. Identified specimens may be interdependent; that is, two or more specimens may be from the same anatomical element. The numerical difference between two NISP totals does not represent an exact distance (interval scale) in total number of elements and, therefore, total number of individuals. Minimum number of individuals values are derived from each taxon by totalling the most common element or portion of element in an aggregation unit (stratigraphic level or spatially isolated area), with regard to side of body and/or age of specimen. Since each bone-specimen aggregation has a "most common element", the total MNI count for each taxon and for the site as a whole generally increases as the number of aggregation units increases. The problem of specimen interdependence with NISP counts is avoided with MNI totals since each "minimum individual" is independent of every other, making MNI totals better approximations of the actual number of individuals present on a particular site. MNI count is the minimum number of individuals needed to account for all specimens in an aggregation unit, however, and the actual abundance of a taxon may vary from the minimum number to some unknown higher figure (but not higher than the NISP). Therefore, MNI values also do not provide exact values (interval scale) of taxonomic abundance and cannot provide measures that are more than ordinal in scale (see Grayson 1979 for more detailed discussion).

In this study, MNI counts are derived for each taxon from identified specimens in aggregation units that generally correspond to cultural occupational sequences present on each site. MNI counts are not derived for

broader taxonomic categories since specimens in these categories may be remains of the same individuals identified in genus and species categories, except when individuals of that particular size range are not otherwise represented in an aggregation unit. This technique minimizes the probability that a given individual is counted more than once.

Degree of physical weathering present on each bone specimen is recorded here to construct an index of bone preservation for each site collection, following bone weathering characteristics observed by Behrensmeyer (1978). Specimens are classified by weathering stage, progressing from Stage 0 (fresh or no evidence of weathering) to Stage 5 (heavily weathered and fragmented). A hypothetical Stage 6 could represent completely disintegrated bones no longer recoverable. Weathering stage classification provides a general index of bone preservation for a site or a particular portion of a site. If the distribution of bone specimens is skewed toward Stages 0 and 1, it is reasonable to assume that relatively little weathering has taken place and that no loss of bone from disintegration has occurred. If, however, the distribution of bone specimens is skewed toward Stages 4 and 5, it can be assumed that weathering has altered the collection of bone specimens and that some loss of bones from the original population has occurred through disintegration.

Knowledge of degree of bone weathering and the corresponding indication of potential bone loss through physical disintegration allows for more accurate interpretation of bone collections from archeological contexts. The weathering stage index is useful as a general indication of bone preservation for a population of bone specimens, but is problematic when employed in specific bone to bone comparisons within a population of specimens from archeological deposits.

Bones from immature individuals weather more rapidly than those from adults (Behrensmeyer 1978:160), and age determination is not possible on most bone specimens. Bones of small mammals (less than 5 kg) differ slightly in weathering characteristics from larger mammals, and weathering characteristics of bird and reptile bones have not been determined (Behrensmeyer 1978:153). Finally, the effects of differential bone breakage before deposition on bone weathering need to be worked out. These factors prohibit specific interpopulational comparisons presently, but general application of a weathering stage index is useful for assessment of potential bone loss from the original population of bone fragments from archeological sites.

Plant Macrofossil Analysis

Plant macrofossil studies were undertaken on samples from five of the sites (48UT390, 48UT199, 48UT779, 48UT370 and 48UT445) to obtain information on subsistence patterns, composition of the prehistoric diet and season of site use. A total of 37 bulk matrix samples were processed and examined for charred plant macrofossils, 11 from 48UT390, 15 from 48UT199, eight from 48UT779, two from 48UT370 and one from 48UT445. The bulk samples were processed using water flotation techniques as outlined by

Bohrer and Adams (1977:37). This consisted of pouring the bulk samples into a bucket of water, stirring to allow the organic material to float to the surface and then decanting the water and floating debris through a fine cotton cloth. This process was repeated several times for each sample to insure the complete recovery of all macrofossils. The residue on the cloth was then air-dried and placed in plastic bags for storage prior to analysis. Because other flotation efforts in southwestern Wyoming had recovered such a small number of macrofossils, the majority of fill was processed from each feature.

Each sample was examined under a binocular dissecting microscope at 10x to 15x magnification. Charred plant macrofossils were removed for further analysis. Identifications were made using seed manuals (Albee 1980; Martin and Barkley 1961) and the seed reference collection in the Garrett Herbarium at the Utah Museum of Natural History, University of Utah.

Uncharred seeds were excluded from the analysis because they were probably introduced into the site by burrowing organisms such as rodents and insects and their inclusion would have resulted in erroneous interpretations about the use of the various taxa. Even under very favorable conditions of preservation, uncharred seeds tend to decompose in less than a century after deposition (Minnis 1981).

CHAPTER 4

AUSTIN WASH SITE (48UT390)

Introduction

The Austin Wash Site (48UT390) is a large multicomponent site situated on a terrace north of Austin Wash in southwestern Wyoming (Figs. 7, 8). Several different prehistoric loci within the site area have been previously tested yielding radiocarbon dates ranging from about 3000 years ago to about A.D. 800. During the 1983 excavations, P-III Associates excavated a Late Prehistoric antelope processing loci dating to about A.D. 800 in the northern portion of the site. Excavations in this area of the Austin Wash Site produced the largest artifact assemblage from the data recovery program including more than 700 formal tools and 21,000 pieces of debitage. More than 16,000 bone fragments, most from pronghorn antelope, were also recovered. The excavations revealed one large activity area with 16 features including roasting pits, ash pits and postholes. The contemporaneity of the radiocarbon dates, the diagnostic implements and the uniformity of the artifact assemblage indicate that excavated materials represent a single occupational episode in this area of the site.

Previous Investigations

The Austin Wash Site was first recorded in June of 1980 (Collins and Jennings 1980) during a cultural resource inventory conducted for the MAPCO Pipeline Project. Three months later, it was rerecorded, mapped, surface collected and tested for subsurface deposits (Nelson and Bleacher 1981). The subsurface testing, which involved both manual and backhoe excavation, revealed buried cultural deposits which were subsequently avoided by realignment of the pipeline. Additional surface collections and testing were undertaken in 1981 to determine the nature and extent of the subsurface materials (Reiss and Walker 1982). These excavations identified the buried animal processing area that was excavated during this project.

The combined 1980-1981 surface collections at the site yielded a total of 2169 lithic tools and debitage from a 1359 m² area. The testing of roughly 6 m³ produced an additional 4828 lithic tools and debitage, and more than 2100 fragments of animal bone. Four fire hearths consisting of concentrations of thermally altered rock associated with tools, flakes, burned bone and charcoal staining were also discovered during the testing. Charcoal from three of these hearths yielded radiocarbon dates of

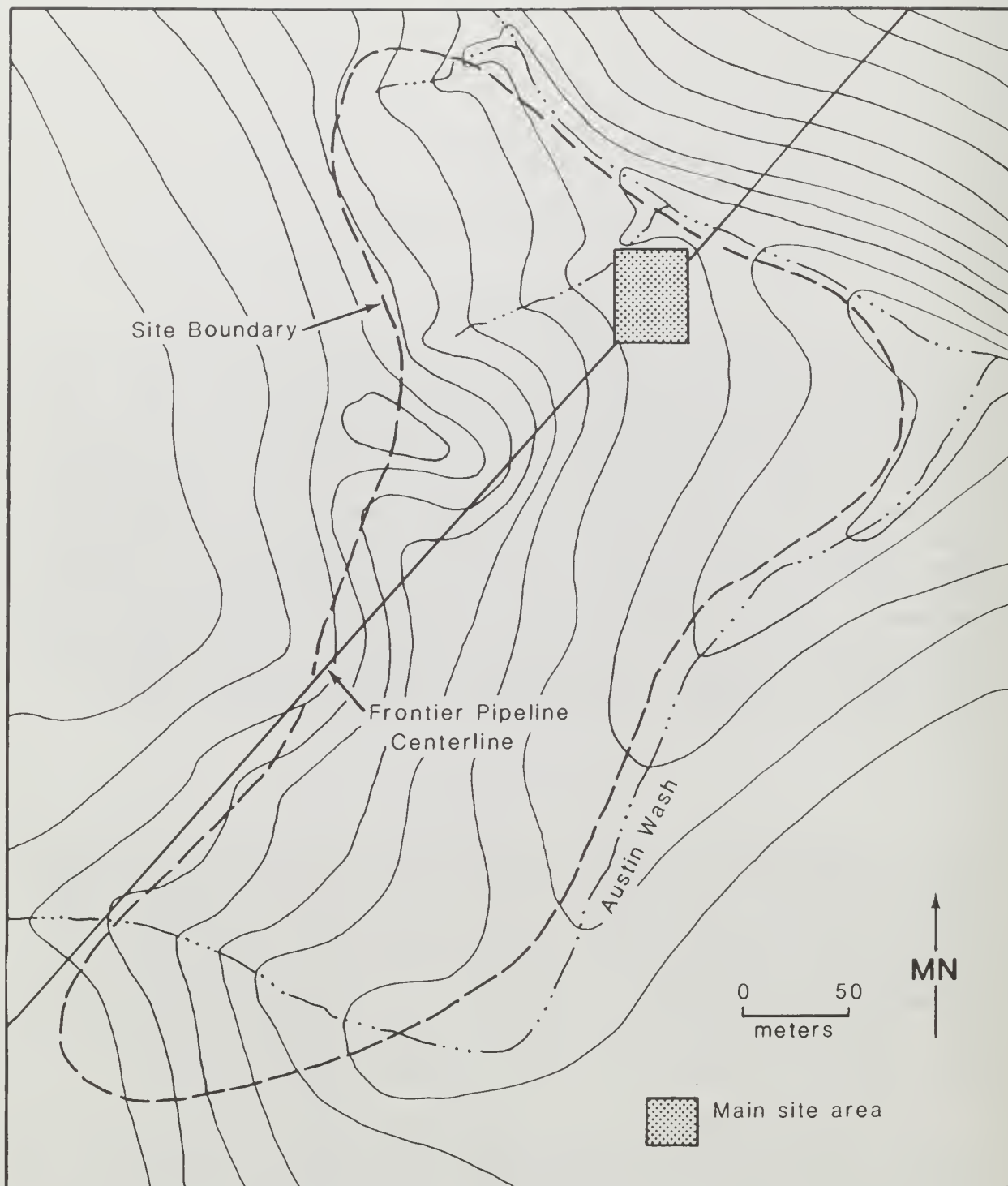


Fig. 7. Plan map of the Austin Wash Site, 48UT390, Uinta County, Wyoming.

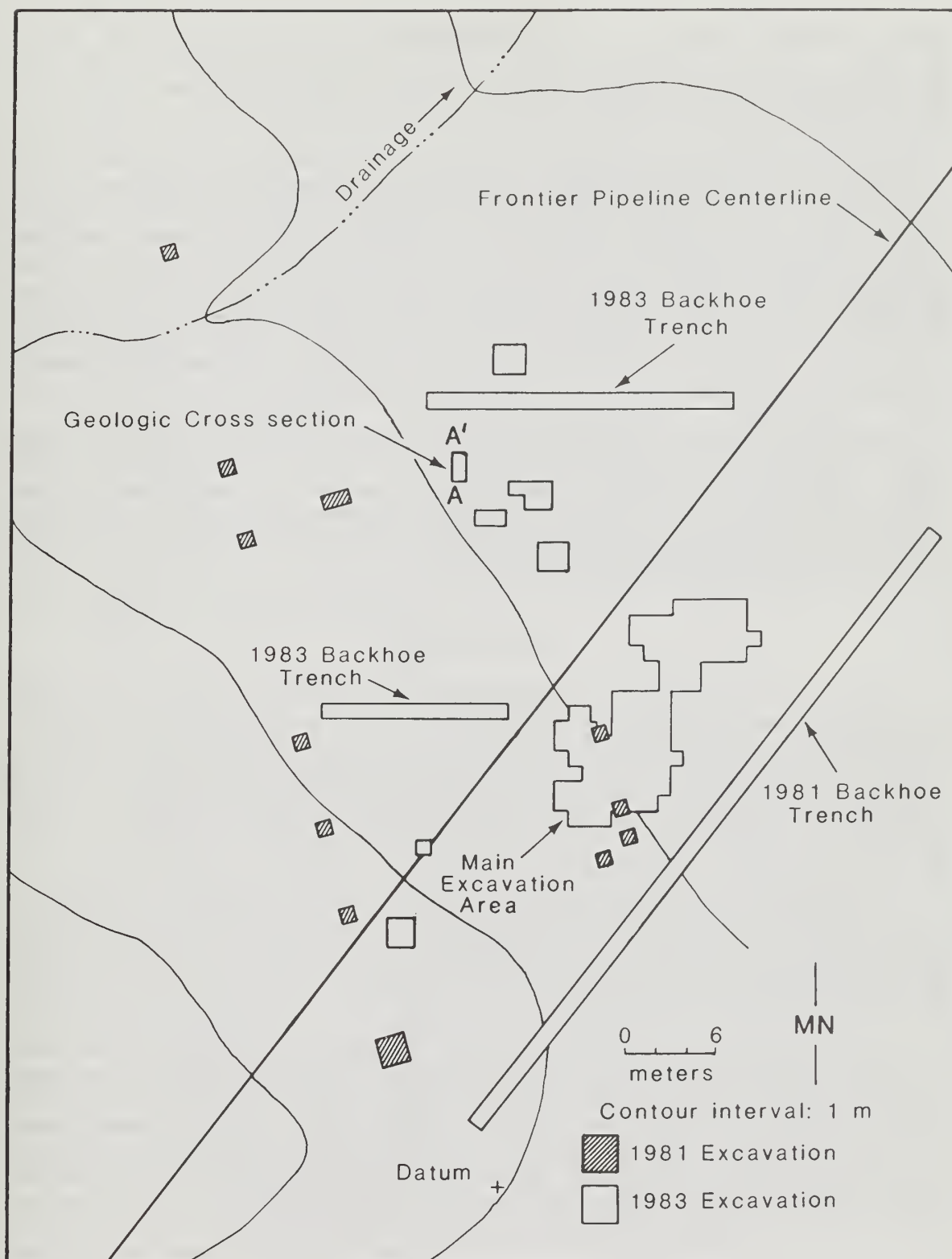


Fig. 8. Plan map of the main site area and excavation units, Austin Wash Site, 48UT390, Uinta County, Wyoming.

3030 \pm 120 years:1080 B.C., 1740 \pm 60 years:A.D. 210 and 1100 \pm 70 years:A.D. 850. On the basis of these dates and the eight Archaic and Late Prehistoric projectile points collected at the site, the investigators suggested that the site is multicomponent.

The investigators also noted that five of the test units at the north end of the site produced abundant quantities of animal bone within a charcoal stained matrix indicating the presence of a bone midden (Fig. 8). Excavations in this midden produced the remains of at least three pronghorn antelope and an associated date of 1140 \pm 80 years:A.D. 810. Based on this limited testing, the excavators postulated that the buried bone midden encompassed at least 100 m² and concluded that the site was potentially eligible for National Register of Historic Places. They recommended that additional excavations be conducted to investigate the bone midden (Reiss and Sanders 1982:276) if the site were to be impacted by future activities.

In June 1982, the site was relocated during a cultural resource inventory of the Frontier Pipeline right-of-way. The investigators believed that pipeline construction would damage a portion of the bone midden and recommended that a data recovery program be implemented unless the pipeline could be realigned. Realignment was not feasible and the site was included in the present data recovery program.

Field Methods

While the site itself covers more than 100,000 m², most of the 1983 excavations were confined to a block area in and around the bone midden. The fieldwork was begun by establishing a datum at the southwest corner of the site, staking in a grid system, mapping the site surface and conducting the magnetic survey. Although the 1980-1981 testing used a grid system oriented on true north, the 1983 excavations were aligned on magnetic north to facilitate interpretations of the magnetic survey.

Following the establishment of a grid system, Test Unit 14 from the 1981 investigations (Reiss and Walker 1982) was reopened to observe the stratigraphy. Excavations then proceeded to the north, east and west in an attempt to define the limits of the bone midden. A block area measuring 90 m² was excavated in this area.

The magnetometer survey identified five loci of magnetic anomalies outside the main midden area. An additional 22 m² were excavated to investigate the origin of these anomalies. These excavations produced one ill-defined ash stain and one rock-filled firepit which was radiocarbon dated to 1370 \pm 60 years:A.D. 580 (Beta 7271). Two backhoe trenches, 20 m and 12 m long respectively, were also excavated. They revealed no further subsurface cultural material within the pipeline right-of-way.

Site Setting

The Austin Wash Site is located in the southwestern portion of the Green River Basin in southwestern Wyoming. It lies at an elevation of approximately 1954 m (6410 ft) and is positioned in a valley bottom between a series of gravel-capped hills. The site itself is situated on the upper of two terraces above and just west of the confluence of Austin Wash and an unnamed, ephemeral drainage that flows from the northwest. This terrace is relatively flat at the confluence, but slopes gently upward to the north and west where it merges with steep colluvial slopes that form the site's western boundary. The site area is intermittently covered with Pleistocene gravel deposits containing flakeable quartzite and chert cobbles (Reiss and Sanders 1982:226). Austin Wash is a perennial stream that enters the Blacks Fork River 2.4 km east of the site.

The site is situated in a predominately sagebrush community. Plants observed within the site area include big sagebrush, rabbitbrush, greasewood, shadscale, hopsage, four-wing saltbush, Gardner's saltbush, broomrape, biscuitroot, buckwheat, Indian paintbrush, penstemon, phlox, cryptanta, collomia, locoweed, desert evening primrose, death camas, larkspur, scarlet globe mallow, daisies, desert sandwort, mustards, wild onion, prickly pear cactus, Indian rice grass, needle-and-thread grass, squirrel-tail grass and wheat grasses. Halogeton, Russian thistle and cheatgrass are present in disturbed areas.

Stratigraphy

Although the matrix at this site was primarily sandy colluvium, it incorporated a large eolian sand component. Three distinct strata, A, B and C (Fig. 9), were identified by the geomorphologist (Oviatt 1983). Stratum A, the earliest, consisted of a coarse, caliche-rich colluvium containing clasts of the local bedrock and rounded cobbles from Pleistocene terrace deposits emplaced by the Blacks Fork River. This stratum was culturally sterile and located 30 to 40 cm below the ground surface. It probably dates to the early to mid-Holocene. Stratum B varied from 10 to 40 cm thick and consisted of a colluvial/eolian matrix intermixed with small pebbles. It was overlain by Stratum C, a very thin layer of colluvial/eolian sand possessing a virtually identical grain-size distribution to Stratum B (Fig. 10). The high eolian component in Strata B and C was apparently caused by the deposition of eolian sand--from the upland surface west of the site--on the slopes above the site. After being mixed with local slope deposits, it was both blown and washed to the slope where it accumulated on the site. Strata B and C were locally separated by a moderately developed argillic horizon. The development of this horizon may be related to the presence of greasewood (Sarcobatus vermiculatus), the decomposing foliage of which concentrates sodium cations in the soil, thereby inducing clay translocation (Oviatt 1983). Fig. 11 depicts north/south and east/west cross sections of the excavated area.

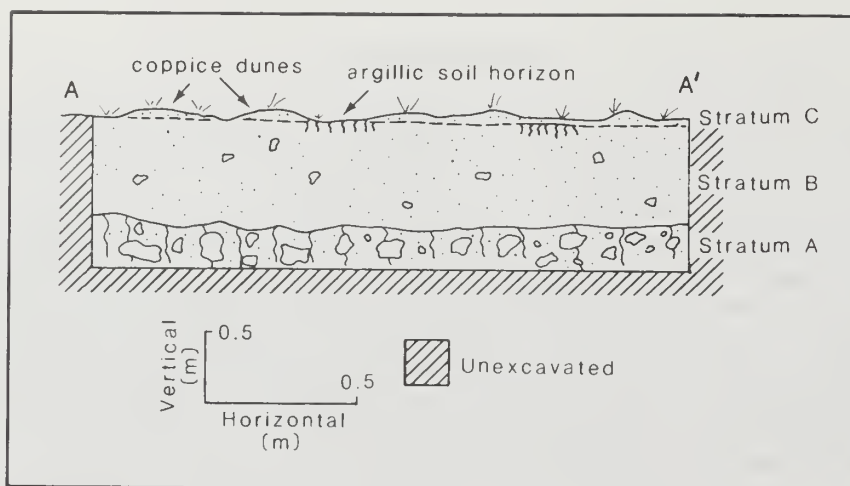


Fig. 9. Generalized geological cross section of the Austin Wash Site, 48UT390, Uinta County, Wyoming.

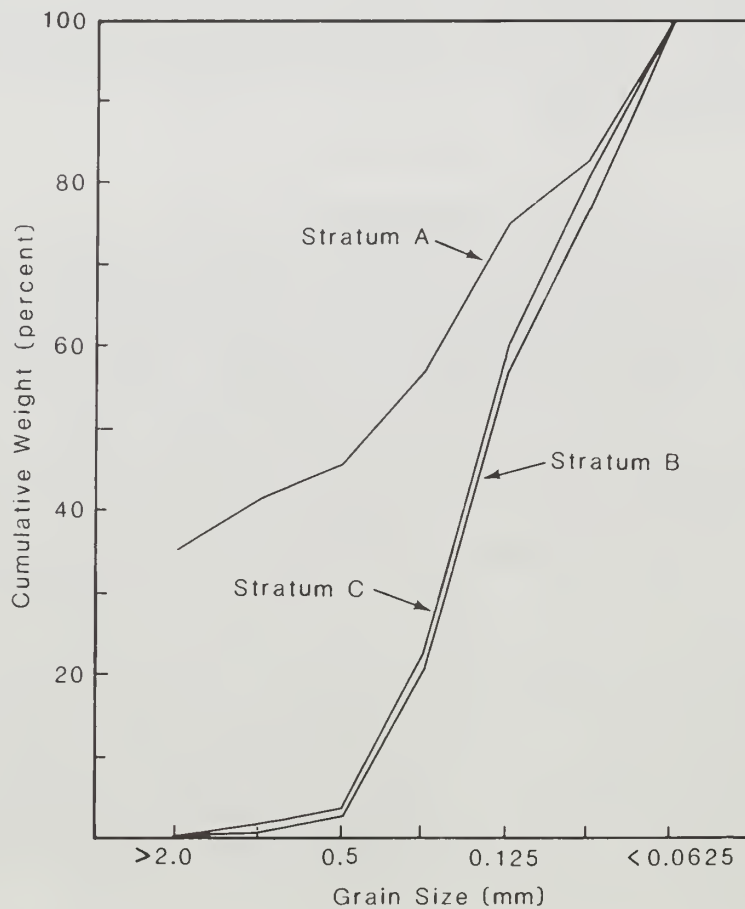


Fig. 10. Grain-size distribution curves for sediment samples, from the Austin Wash Site, 48UT390, Uinta County, Wyoming.

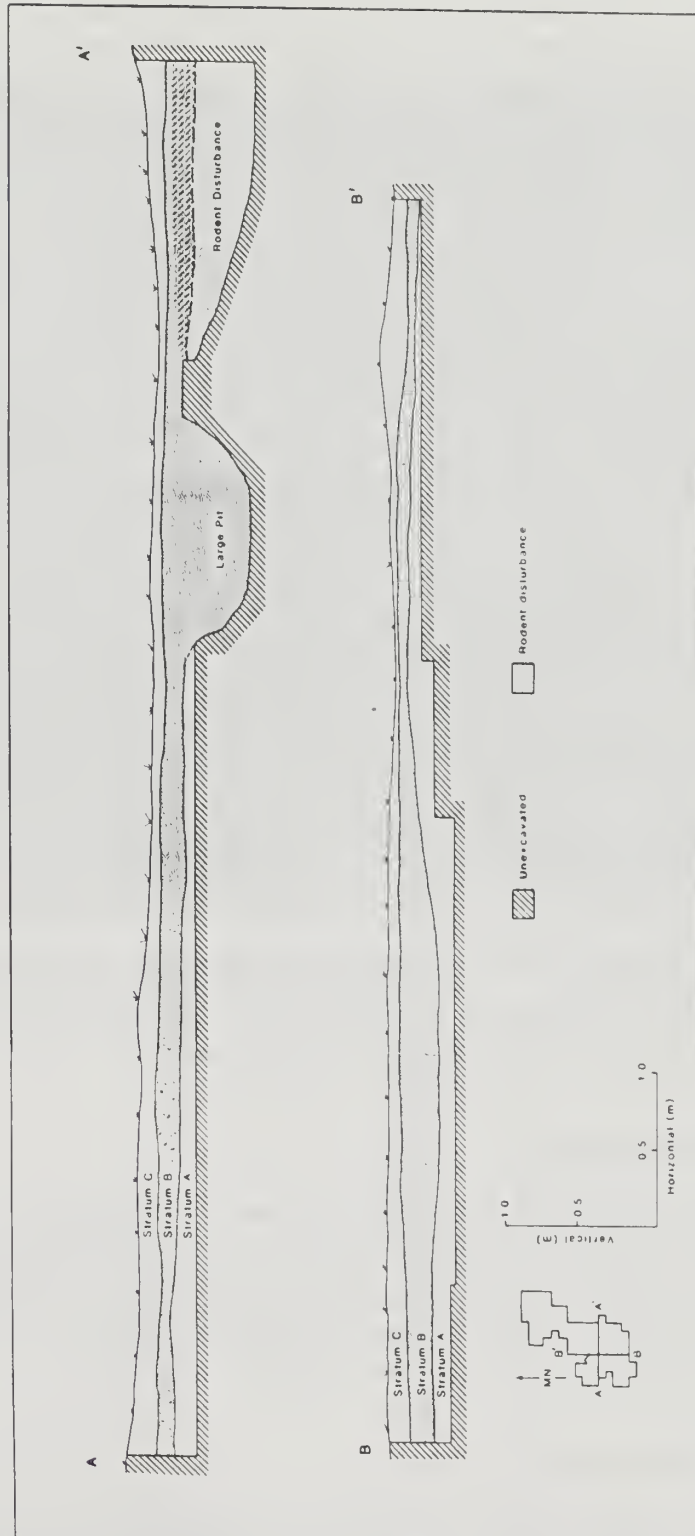


Fig. 11. Cross section of stratigraphy in main excavation area, Austin Wash Site, 48UT390, Uinta County, Wyoming.

The bone midden and all of the cultural deposits were confined to Stratum B. No separate distinct cultural layers were identified within the stratum indicating that the prehistoric occupation in this area was probably a single-occurrence phenomenon. The radiocarbon dates and the artifact analyses all support the interpretation of a single occupation. These same data indicate that it occurred during the Late Prehistoric and was relatively short term.

Cultural Features

The primary cultural feature in the excavation area is the bone midden consisting of a dense scatter of bone fragments, thermally altered rock, tools and debitage in a dark, organically stained matrix (Fig. 12). Fig. 13 shows one of the more dense artifact concentrations in the midden area. The absence of articulated bones, as well as the diversity of artifacts and high frequency of features, indicate that the midden represents a processing locale rather than a primary kill site where butchering took place.

Excavations in the bone midden revealed 16 cultural features; two other features were also discovered outside of the main excavation area in test pits placed to investigate magnetic anomalies. These 18 features were subdivided into four general groups based on morphology, nature and contents of the fill and inferred function. These groups are firepits, pits, midden concentrations and postholes. Fig. 14 depicts the feature locations in the main excavation area.

Firepits

Six firepits were discovered during the excavations. All were characterized by charcoal, ash and fire reddening. Five of the firepits were filled with thermally altered rock. The sixth was a shallow, unlined hearth excavated into the surrounding matrix.

Rock-filled Firepits

The rock-filled firepits were deep, circular to oval basins partially excavated into the underlying clay. They generally contained black fill with high charcoal content. All of the pits contained thermally altered rock and cobbles, some of which were fractured. Five rock-filled features were excavated, three in the main excavation area, one each to the northwest and southwest of the bone midden.

Rock-filled Firepit 1

This rock-filled firepit was uncovered 11 m northwest of the main excavation area while excavating anomalies identified by the magnetic survey. Test excavations indicated that the midden deposits were not



Fig. 12. General view of excavations showing the main midden area, Austin Wash Site, 48UT390, Uinta County, Wyoming.



Fig. 13. Close-up of midden concentration, Austin Wash Site, 48UT390, Unita County, Wyoming.

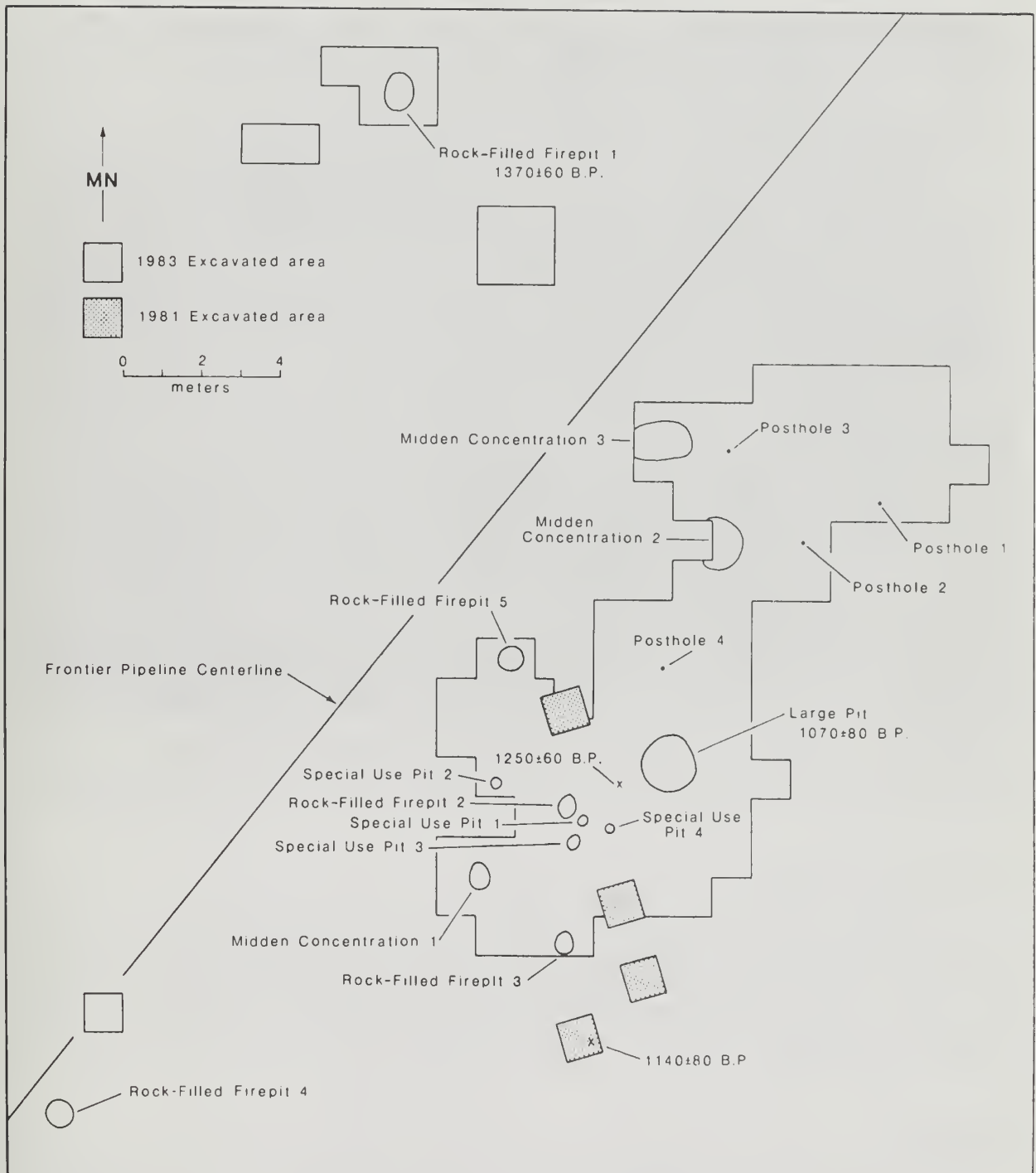


Fig. 14. Plan map of the main excavation area at the Austin Wash Site, 48UT390, showing location of features and radiocarbon dated samples.

continuous between this feature and the main excavation area. The pit was shallow, basin-shaped and measured 90 by 75 cm and 10 cm deep. The bottom of the pit was lined with thermally altered quartzite cobbles. The fill was a dark sandy matrix that lacked artifacts. Charcoal recovered from the pit yielded a radiocarbon date of 1370 ± 60 years:A.D. 580 (Beta 7271).

Rock-filled Firepit 2

Rock-filled Firepit 2 (Fig. 15) was a deep, circular pit measuring 53 by 54 cm and 31 cm deep. The pit had an irregular floor and was filled with thermally altered quartzite cobbles imbedded in a dark-stained clay loam. Cultural materials present in the pit included charcoal, charred and uncharred bone, debitage, two hammerstones and a Rose Spring projectile point. The majority of artifactual material was located in the upper 15 cm of the pit. Radiocarbon analysis of charcoal collected from the pit yielded a date of 1160 ± 50 years:A.D. 790 (Beta 7273).

Rock-filled Firepit 3

This basin-shaped, circular pit measured 63 by 69 cm and was only 15 cm deep (Fig. 16). Although no bone was noted within the fill of the pit, it contained charcoal, debitage and thermally altered quartzite cobbles.

Rock-filled Firepit 4

This rock-filled firepit was located 10 m southwest of the southwest corner of the main excavation area during the blading of the right-of-way. The pit was partially destroyed, but appeared to be circular in plan measuring 60 by 64 cm. It was filled with quartzite and sandstone cobbles, and a small amount of charcoal. No artifacts were observed. This firepit may have been associated with the main concentration of cultural materials.

Rock-filled Firepit 5

This rock-filled firepit was a deep, circular basin excavated into the center of Firepit 1. This feature was 60 cm in diameter and 30 cm deep. The fill was a black sand containing numerous large pieces of charcoal. The rim of the pit and some areas of the pit floor were oxidized. This firepit contained abundant bone and debitage as well as a basal-notched, corner-tanged knife.

Firepit 1

A single firepit, lacking thermally altered cobbles, was recorded in the main excavation area. This large, shallow firepit measured 160 by 210 cm and was 15 cm deep. The mottled medium to dark brown matrix contained large quantities of burned and unburned bone, debitage, small pieces



Fig. 15. Rock-filled Firepit 2, Austin Wash Site, 48UT390, Uinta County, Wyoming.



Fig. 16. Rock-filled Firepit 3, Austin Wash Site, 48UT390, Uinta County, Wyoming.

of thermally altered rock and several large pieces of charcoal. Rock-filled Firepit 5 had been excavated through the center of this shallow firepit.

Pits

Four small pits and one large pit were recorded during the excavations. None exhibited the fire reddening, ash or extensive charcoal that would be expected from hearths. Their function is problematical.

Large Pit

This pit, the largest discovered at the site (Fig. 17), was a large, circular basin measuring 150 cm in diameter and 45 cm deep. It was associated with the most dense artifact concentration in the midden area. Cutting tools and debitage occurred both in and around the pit to the south and northeast. The pit also contained large quantities of antelope and bison bone, some of which were articulated and most of which were uncharred. Although some charcoal staining was present, there was no ash or oxidation as would be expected from a roasting pit or hearth. However, the frequency of debitage, tools and bone suggest that this pit was a focal point of cultural activity, at least in the area excavated during this project.

Special Use Pits

Four special use pits were discovered in the southern end of the main excavation area. Although their function is unknown, three of the four were located within a meter of Rock-filled Firepit 2, suggesting that they may have been functionally related with this hearth.

Special Use Pit 1

This small, circular basin was located adjacent to Rock-filled Firepit 2 and measured 31 by 34 cm and 12 cm deep. It contained dark, charcoal-stained sand, several small bone fragments and some very small pieces of thermally altered rock fragments.

Special Use Pit 2

Special Use Pit 2 was situated 140 cm west of Rock-filled Firepit 2. It was roughly circular in plan and had straight to slightly encircling walls. The bottom of the pit was slightly rounded and sloped up to meet the walls. A limited amount of bone and artifactual material was recovered from this pit.



Fig. 17. Large Pit, Austin Wash Site, 48TU390, Uinta County, Wyoming.

Special Use Pit 3

Special Use Pit 3 was a circular stain measuring 22 cm in diameter and 10 cm deep. The fill was a burned sand, containing ash, charcoal, bone and artifacts. The pit was basin-shaped in profile except for the north wall, which was straight. Special Use Pit 3 was located 50 cm south of Rock-filled Firepit 2.

Special Use Pit 4

Special Use Pit 4 was located 1 m southeast of Rock-filled Firepit 2 and less than 1 m from Special Use Pits 1 and 3. It was small, measuring only 16 by 15 cm and had a depth of 15 cm. The fill consisted of dark, stained soil interspersed with small pieces of charcoal. The pit contained one flake, two bone fragments and several small pieces of thermally altered rock.

Midden Concentrations

While artifactual material was common throughout the main excavation area, three areas exhibited concentrations of artifacts and faunal remains. These areas have been designated as midden concentrations (Fig. 14).

Midden Concentration 1

Midden Concentration 1 was a shallow, oval depression measuring 50 by 70 cm across and 14 cm thick. It contained dark, mottled fill and significantly more cultural material than the surrounding areas. Cultural materials included thermally altered rock, charcoal, bone and the base of a large, hafted knife. The bottom of the depression was somewhat diffuse.

Midden Concentration 2

Like Midden Concentration 1, this feature was an area of higher artifact density situated in a slight, poorly defined depression. The boundaries, however, were more diffuse. Concentration 2 was roughly 100 cm in diameter and 8 to 10 cm thick. It contained about 260 pieces of debitage, 60 pieces of thermally altered quartzite, 50 bone fragments and a large amount of charcoal. The surrounding area contained considerably less cultural material. Midden Concentration 2 was situated at the northern end of the excavated area near Posthole 2.

Midden Concentration 3

This large, oval stain with diffuse borders measured approximately 150 cm north/south by 200 cm east/west and 13 cm thick. Artifacts recovered from the feature include approximately 250 pieces of debitage, 70 thermally

altered rocks and cobbles, 130 bone fragments, eight bifaces, three cores and two projectile point tips. Midden Concentration 3 was located about 2 m north of Midden Concentration 2 in the north end of the main excavation area.

Postholes

Four postholes were identified during the excavations (Fig. 18). They range from 9 to 14 cm across and 6 to 9 cm deep. All were small, round to oval pits with straight to slightly sloping walls and flat to slightly rounded bottoms. All contained fill that was darker than the surrounding matrix. Because the irregular distribution of the postholes does not suggest the presence of a structure, the postholes may represent randomly placed posts of racks used for drying meat or possibly the remnants of a pound.

Flaked Stone Artifacts

A total of 753 flaked stone tools and 21,742 pieces of debitage were recovered during P-III Associates' excavations at the Austin Wash Site. The tool assemblage consists of 38 projectile points, 29 knives, six drills, 46 bifacial blanks, 106 preforms, 104 scrapers, 36 graters, 213 modified flakes and 154 core tools, cores and cobbles. Almost all of these items were recovered from the bone midden in the southern half of the main excavation area (Table 3). One Eden point, three corner-notched points and two hafted knives recovered during previous investigations are also included in our analysis.

Bifaces

Bifaces were defined as artifacts exhibiting flaking on both faces and around the entire perimeter. This category consists of 38 whole and fragmentary projectile points (Figs. 19, 20, Table 4), 29 knives, six drill fragments, 46 bifacial blanks and 106 preforms.

Projectile Points

Eden

The base and midsection of an Eden point was recovered from the surface of the Austin Wash Site in 1980 (Sanders 1982). This slightly shouldered tan chert point fragment exhibits heavy grinding along the lateral edges of the base (Fig. 19a).

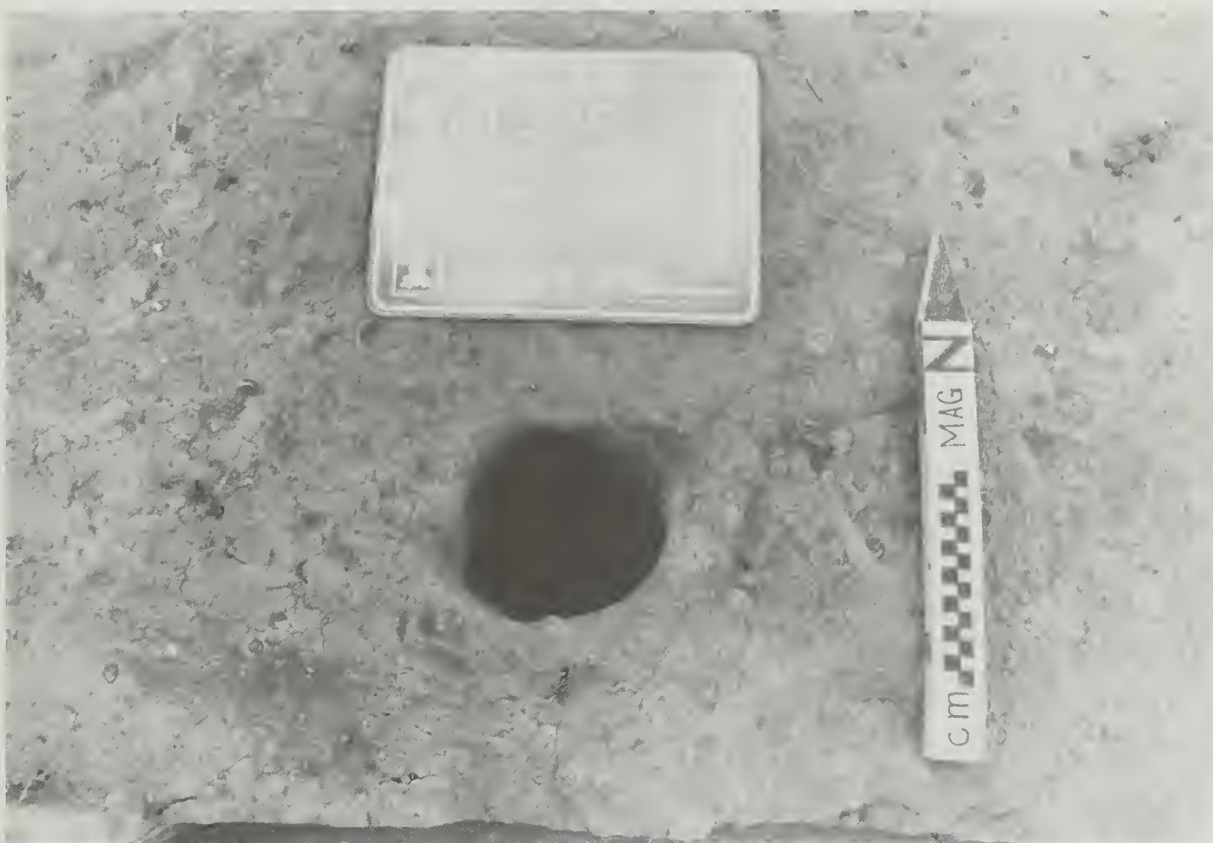


Fig. 18. Posthole, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Table 3. Distribution of flaked stone artifact classes by material type,
Austin Wash Site, 48UT390, Uinta County, Wyoming.

Artifact Class	Quartzite		Chalcedony			Chert							Other	Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algaltic	Solid Brown	Solid Other	Mottled/Speckled			
<u>Bifaces</u>														
Projectile Points														
Eden	0	0	0	0	0	0	0	0	0	1	0	0	1	
Lovell Constricted	0	1	0	0	0	0	0	0	0	0	0	0	1	
Lanceolate	0	0	0	0	0	0	0	0	0	0	1	0	1	
Corner-notched	0	0	0	0	0	0	0	3	1	1	1	0	6	
Avonlea	0	0	1	0	0	0	0	0	0	0	0	0	1	
Rose Spring	0	0	1	1	6	0	0	4	1	2	1	0	16	
Other fragments	0	0	1	2	2	0	0	2	1	1	3	0	12	
<u>Knives</u>														
Hafted knives	2	2	0	0	1	0	0	3	1	0	1	0	10	
Knives	3	5	0	0	0	0	0	10	0	0	0	1	19	
Drills	0	0	1	1	2	0	0	1	1	0	0	0	6	
Blanks	1	0	12	1	5	0	0	18	2	2	5	0	46	
Preforms	2	6	16	5	10	0	0	48	5	5	5	4	106	
<u>Unifaces</u>														
Scrapers	0	7	1	0	10	0	0	81	0	4	1	0	104	
Gravers	0	1	1	0	2	0	0	32	0	0	0	0	36	
<u>Modified flakes</u>														
Serrated flakes	0	2	0	0	0	0	1	6	0	0	0	0	9	
Notched flakes	0	1	0	0	0	0	1	36	0	0	0	0	38	
Bladelike flakes	1	0	0	0	2	1	0	28	0	0	0	0	32	
Other Modified flakes	2	2	1	0	5	0	0	137	3	1	4	0	155	
<u>Cores, tools and cobbles</u>														
Choppers	0	0	0	0	0	0	0	5	0	0	0	0	5	
Gouges	0	0	0	0	0	0	0	6	0	0	0	0	6	
Wedges	0	0	0	0	0	0	0	6	0	0	0	0	6	
Modified cobbles	3	11	1	0	1	0	0	0	0	0	0	0	16	
Cores	1	11	28	2	3	4	1	66	0	4	1	0	121	
Total	15	49	64	12	49	5	3	492	15	21	23	5	753	



Fig. 19. Selected projectile points, 48UT390, Uinta County, Wyoming. a, Eden point fragment; b, Lovell Constricted; c, Lanceolate; d-i, corner-notched points; j, side-notched point

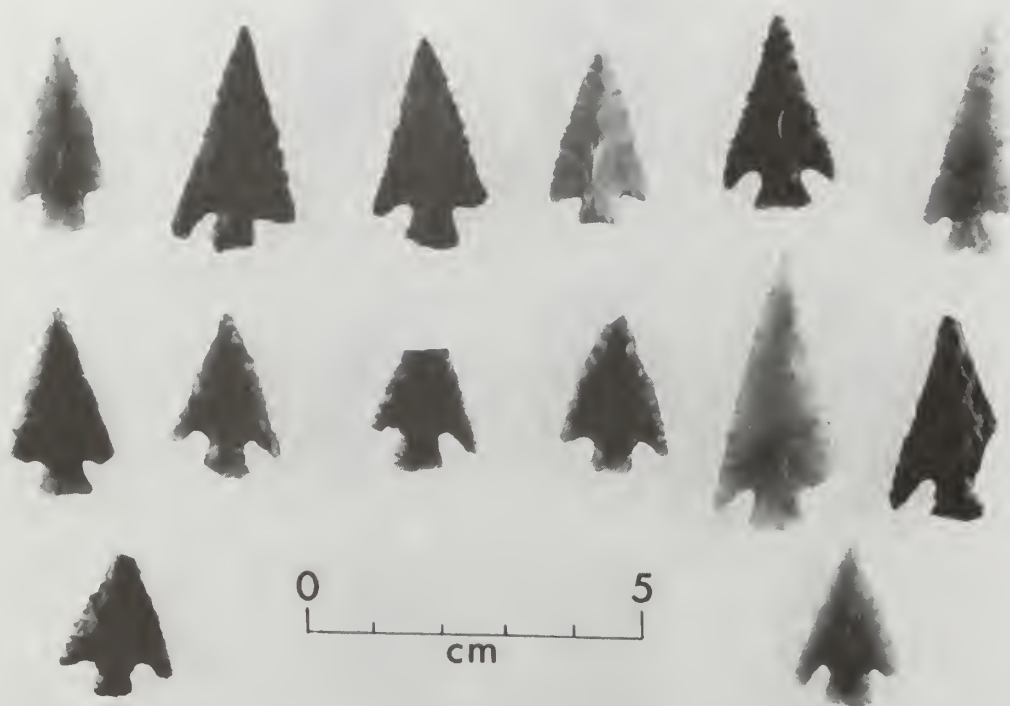


Fig. 20. Selected Rose Spring points, 48UT390, Uinta County, Wyoming.

Table 4. Provenience and characteristics of projectile points, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Acquisition Number	Grid Location	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Neck Width (mm)	Base Width (mm)	Notch	Base	Blade Shape	Blade Margin	Cross Section
500	surface	Eden	solid other chert	---	1.7	0.5	1.4	1.3	---	straight/ slightly concave	---	---	biconvex
1354	121N/90E 121N/89E	Lovell Constricted	other quartzite	---	2.7	0.8	1.6	1.4	---	concave	lanceolate	excavate	biconvex
1343	122N/90E	Rose Spring	algalitic chert	3.1	---	0.4	0.6	0.8	corner	convex	triangular	slightly excavate	biconvex
1342	119N/91E	Rose Spring	algalitic chert	3.3	1.9	0.4	0.6	0.7	corner	---	triangular	slightly straight	biconvex
1330	120N/93E	Rose Spring	algalitic chert	3.0	---	0.3	0.5	0.5	corner	convex	triangular	straight	plano-convex
1332	126N/96E	Rose Spring	other chalcedony	2.7	1.7	0.3	0.6	0.9	corner	concave	triangular	straight	plano-convex
1340	122N/91E	Rose Spring	solid other chert	2.4	1.5	0.3	0.6	0.7	corner	convex	triangular	excavate	biconvex
1337	121N/92E	Rose Spring	algalitic chert	3.1	1.8	0.4	0.6	0.8	corner	convex	triangular	excavate	biconvex
1331	122N/93E	Rose Spring	other chalcedony	2.9	1.5	0.3	0.6	0.7	corner	convex	triangular	excavate/ excavate	biconvex
1336	121N/94E	Rose Spring	other chalcedony	2.5	1.6	0.4	0.5	0.7	corner	convex	triangular	excavate/ straight	biconvex
1341	124N/94E	Rose Spring	gray/white chalcedony	4.1	2.0	0.4	0.7	0.8	corner	convex	triangular	excavate/ straight	biconvex
1335	120N/94E	Rose Spring	brown chert	2.8	1.6	0.4	0.6	0.9	corner	straight	triangular	excavate	biconvex
1339	122N/95E	Rose Spring	mass agate	3.3	1.5	0.3	0.6	0.8	corner	straight	triangular	excavate/ straight	biconvex
1346	120N/94E	Rose Spring	solid other chert	2.3	1.7	0.3	0.5	0.6	corner	convex	triangular	excavate	biconvex
1347	120N/94E	Rose Spring	other chalcedony	2.5	1.6	0.4	0.6	0.7	corner	straight	triangular	excavate	plano-convex

Table 4. Continued.

Acquisition Number	Grid Location	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Neck Width (mm)	Base Width (mm)	Notch	Base	Blade Shape	Blade Margin	Cross Section
1333	119N/95E	Rose Spring	mottled/speckled chert	2.6	1.5	0.4	0.6	0.7	corner	concave	triangular	excavate/straight	biconvex
1345	123N/94E	Rose Spring	other chalcedony	—	1.7	0.3	0.6	0.8	corner	convex	triangular	—	—
1411	128N/95E	Rose Spring	other chalcedony	—	1.6	0.3	0.6	—	corner	—	triangular	concave	biconvex
1353	118N/90E	lanceolate	mottled/speckled chert	3.3	1.8	0.5	1.7	1.6	—	concave	lanceolate	excavate	biconvex
623*	surface	corner-notched	brown chert	—	2.3	0.6	1.6	2.1	corner	straight	—	—	biconvex
493*	surface	corner-notched	algalitic chert	—	2.1	0.5	1.0	—	corner	straight	—	excavate/encurve	biconvex
1351	124N/94E	corner-notched	algalitic chert	—	—	0.5	1.2	1.5	corner	slightly concave	—	—	biconvex
1350	120N/90E	corner-notched	algalitic chert	3.0	2.0	0.4	1.1	1.5	corner	concave	triangular	slightly excavate	biconvex
1352	122N/92E	corner-notched	mottled/speckled chert	—	2.3	0.5	1.3	—	corner	slightly convex	triangular	slightly excavate	biconvex
48	surface	corner-notched	solid other chert	3.9	2.3	0.6	1.4	1.5	corner	slightly convex	triangular	slightly excavate/straight	biconvex
1415	119N/94E	side-notched	moss agate	2.9	1.7	0.4	1.1	1.3	straight	—	triangular	excavate	plano-convex

NOTE: Artifacts 48-500 were found during the 1981 testing.

Lovell Constricted

Two fragments of a fine-grained, tan quartzite, Lovell Constricted point were found in adjacent grid units within the bone midden (Fig. 19b). The fragments fit together and represent an almost complete point with only a small portion of the tip missing.

The point is characterized by markedly excurvate blade margins that constrict near the base to form a stem. The base is concave and thinned on both faces, and has heavy grinding on the lateral edges. Although recovered from within the bone midden, it does not represent an earlier occupation in the midden area.

Rose Spring

Excavations at this site produced 16 Rose Spring points (Fig. 20), all associated with the bone midden in the main excavation area. All of the points have small, triangular blades, corner notches and slightly expanding stems. Thirteen have convex bases and three have lightly serrated blade margins. All possible combinations of blade margin curvature are present (Table 4). Convex base shapes were the most common with three straight and two concave.

Although the overall length of these points varies between 2.4 and 4.1 cm, the remaining dimensions are fairly uniform. Width ranges from 1.5 to 1.9 cm. Thickness varies between 0.3 to 0.4 cm. Neck width and base width range from 0.5 to 0.7 cm and 0.5 to 0.9 cm, respectively. Eight of the points are made from chert, four from algalitic chert, two from other chert, and one each from brown chert and mottled/speckled chert. The remaining points include one gray/white chalcedony, one moss agate and six of other chalcedony.

Lanceolate

A short, lanceolate shaped projectile point of a mottled/speckled chert was recovered from the southern end of the main excavation area (Fig. 19c). It has a slightly concave base (Table 4) and measures 3.3 cm long, 1.8 cm wide and 0.5 cm thick. This point is similar in shape and size to a McKean lanceolate point but lacks the pronounced basal notch.

Corner-notched

Six whole and fragmentary corner-notched points were recovered from the Austin Wash Site (Fig. 19d-h). All six are characterized by triangular blades with slightly excurvate to slightly incurvate blade margins and lenticular cross sections. One of the points is notched directly above the corner forming a base that is approximately the same width as the shoulder. Four others have narrower bases; the base of the sixth point is broken. Three of the specimens are made from algalitic chert; one point each is

made from solid brown, solid other and mottled/speckled chert. The complete points are 3.0 and 3.9 cm long, 2.0 to 2.3 cm wide and 0.4 to 0.6 cm thick (Table 4). Neck width ranges between 1.0 and 1.6 cm. Three have bases measuring 1.5 cm wide; another is 2.1 cm wide.

One of the points was found on the surface in 1980 (Collins and Jennings 1980). Two others were surface finds found later that year (Sanders 1982). The remaining three specimens were recovered from the bone midden deposits in 1983.

Side-notched

One small side-notched point was recovered from the bone midden (Fig. 19j). This point is made from a flake of moss agate and appears unfinished. It has a triangular blade with excurvate margins, shallow side notches and is plano-convex in cross section. The tip is flaked into a sharp point and may have been used as a graver.

Projectile Point Fragments

Twelve unidentifiable projectile point fragments were recovered during the excavations. Although some of these fragments are extremely small, all exhibit some of the morphological characteristics of projectile points (e.g., notches, stems or bases). Fragments of bifacial implements lacking such evidence are included in the preform category. Nine of the specimens included in this group appear to be Rose Spring fragments.

Knives

Twenty-nine finely flaked bifaces were classified as knives (Figs. 21-23). They are separated into two categories, hafted knives and other knives.

Hafted Knives

Ten hafted knives were recovered from the Austin Wash Site (Figs. 21-23, Table 5). Four are stemmed (Fig. 21b); three corner-notched (Fig. 21a, c) and two side-notched. The remaining specimen is basal-notched and has a corner tang that was apparently added after the blade was broken (Fig. 21d). One of the stemmed knives has shallow side notches just above the base. Blade shapes include four triangular, three lanceolate and two indeterminate. All of the specimens are biconvex in cross section and all have convex to slightly convex bases.

The complete specimens range from 6.9 to 13.7 cm long, 2.1 to 5.0 cm wide and 0.6 to 0.9 cm thick. Neck and base widths vary between 1.1 and

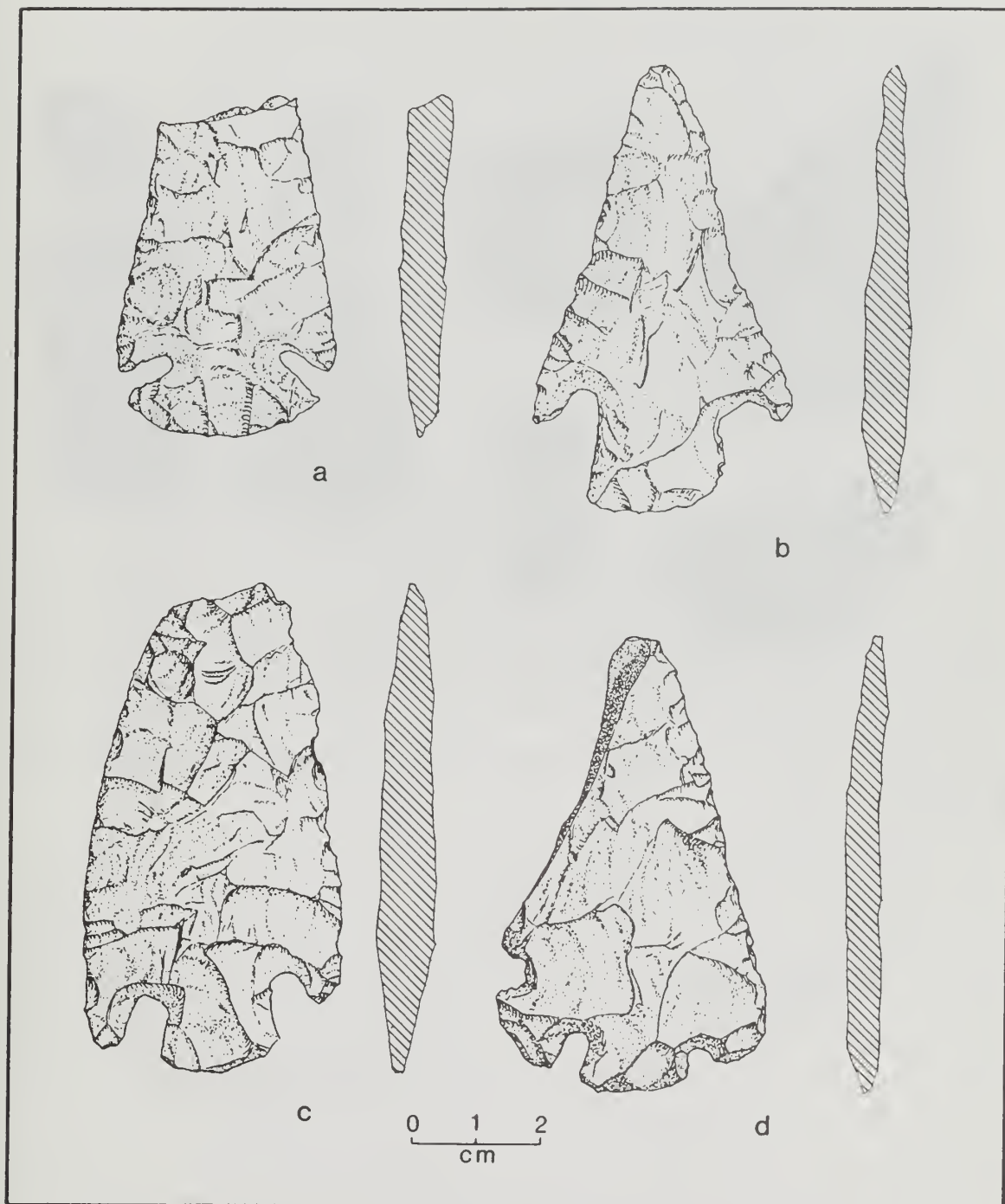


Fig. 21. Selected hafted knives, Austin Wash Site, 48UT390, Uinta County, Wyoming.



Fig. 22. Selected large knives, Austin Wash Site, 48UT390, Uinta County, Wyoming.

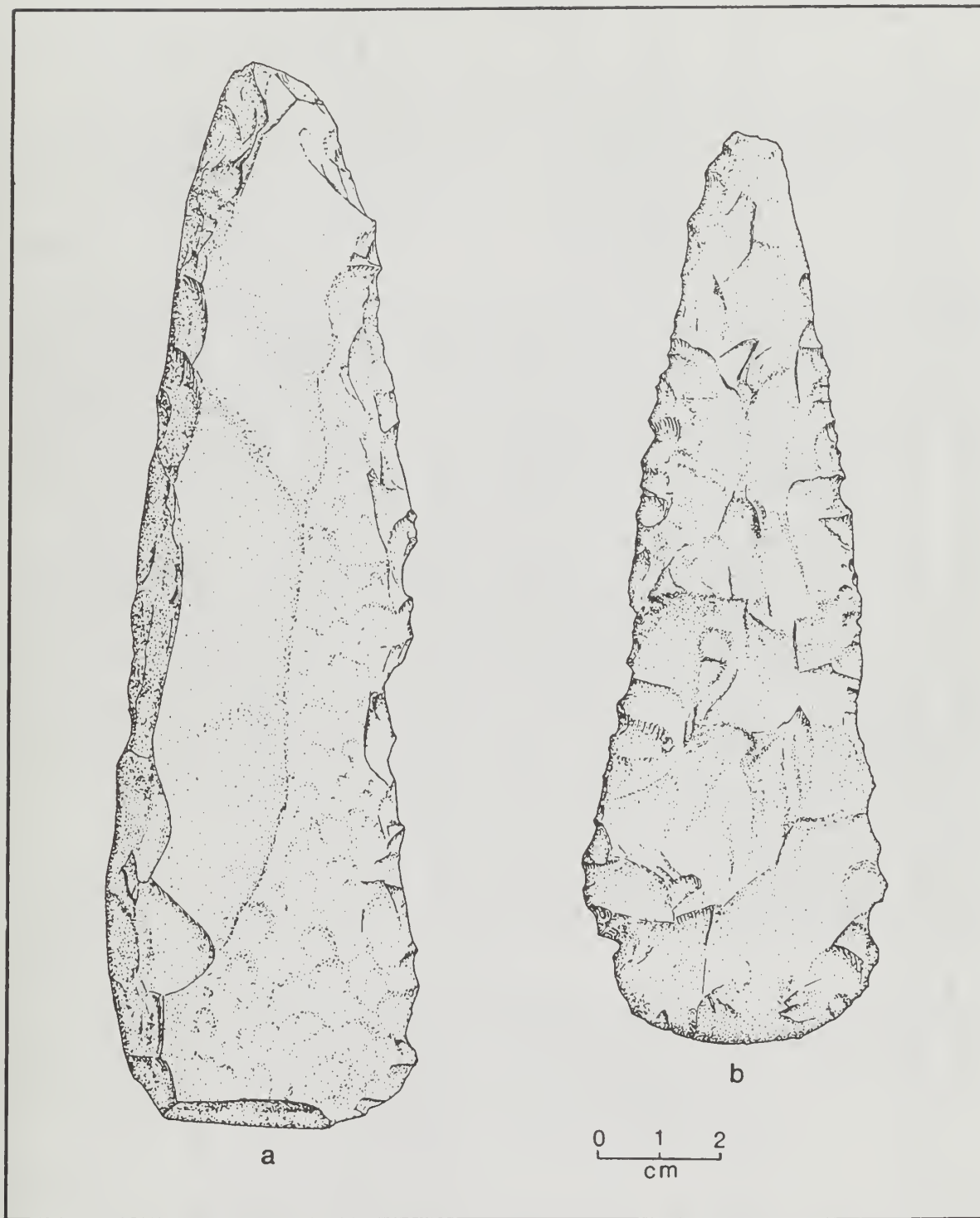


Fig. 23. Selected large bifaces, Austin Wash Site, 48UT390, Uinta County, Wyoming. a, knife; b, hafted knife

Table 5. Provenience and characteristics of hafted knives, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Acquisition Number	Grid Location	Type	Material	Length (mm)	Width (mm)	Thickness (mm)	Neck Width (mm)	Base Width (mm)	Base	Blade Shape	Cross Section	Comments
1429	120N/90E	side-notched	purple quartzite	13.7	4.6	0.7	4.1	4.3	convex	triangular	biconvex	two pieces fitted together
1430	121N/93E											
1427	124N/89E	basal notched and corner tanged	algalitic chert	---	4.2	0.6	1.6	1.7	slightly convex	triangular	biconvex	originally basal-notched; after a transverse break to blade renotched to form corner tang
1423	118N/90E	corner-notched	brown chert	7.5	4.1	0.9	1.8	1.9	convex	lanceolate	biconvex	tip broken and reworked
1424	110N/78E	corner-notched	mottled/speckled chert	---	3.4	0.7	1.7	3.0	convex	triangular	biconvex	
1425	118N/90E	corner-notched	other chalcedony	6.9	4.1	0.7	1.9	2.1	convex	triangular	biconvex	
1426	120N/90E	stemmed	algalitic chert	---	5.0	0.9	3.3	2.3	slightly convex	---	biconvex	reworked, very shallow notches just above base
925	TU16	stemmed	purple quartzite	10.0	3.5	0.8	2.0	1.6	convex	lanceolate	biconvex	found during 1981 testing
1421	120N/93E	stemmed	other quartzite	---	2.1	0.6	1.1	---	---	lanceolate	biconvex	two pieces fitted together-base and distal tip missing
1520	124N/94E											
228	surface	stemmed	other quartzite	---	---	0.6	2.3	2.6	convex	---	biconvex	only stem present, surface find during 1981 testing
1431	123N/89E	side-notched	algalitic chert	---	54	8.0	44	48	convex	---	biconvex	

4.1 cm, and 1.6 and 4.3 cm, respectively. Material types include purple and other quartzite, algalitic chert, brown and mottled/speckled chert, and several colors of chalcedony.

Seven of these large bifacial implements were recovered from the main excavation area; one was recovered from a test pit 2 m south of the main excavation area during the 1981 testing program. The remaining specimens were surface finds.

Other Knives

Eighteen thin, bifacially flaked implements were classified as other knives (Fig. 22). These artifacts are large, finely worked bifaces with regular margins, subrectangular bases measuring 2.4 to 5.4 cm wide, and no evidence of haft elements such as notches or stems. They are lanceolate to triangular in outline and thin in cross section (less than 1 cm), particularly in relation to their size. All appear to be finished tools and all were evidently broken during use. Seven of these bifacial knives are represented by two or more pieces recovered during the excavation.

Twelve of these knife fragments include the basal portion. Six are distal fragments and one, a unique specimen, is described below. All are relatively thin in cross section and usually less than 10 mm thick and display fairly regular and finely worked margins. As noted above, all of the basal fragments lack notching, which distinguishes them from the hafted knives discussed above. The bases are subrectangular to round in outline and range from 24 to 54 mm in width. Because 18 of the specimens are fragments, the overall lengths are unknown; however, some of these fragmentary specimens measure over 100 mm long. Distal fragments are generally lanceolate to triangular in outline and come to a point. Material types for these knives consist of algalitic chert and several colors of quartzite. Except for one of the fragments, all were recovered from the main excavation area. The majority of them were scattered throughout the southern portion where most of the features and other artifacts are concentrated. It is interesting to note that for several of the bifaces represented by two or more fragments, some of the fragments were discovered more than 10 m apart in the excavation area.

The only complete knife in this category is a long flake of fine gray cherty limestone measuring 17.3 cm long, 5.0 cm wide and 13.0 cm thick. It has been bifacially retouched along the margins (Fig. 23a). Besides the margin retouch, there is no other evidence of reduction on the flake. It was found in the main excavation area of the bone midden.

Drills

Six drill fragments, all tips (Fig. 24) were recovered during the excavations. No bases were recovered. These tips exhibit long, parallel sides (up to 25 mm) forming a point at the distal end. All are biconvex in



Fig. 24. Selected gravers and drill fragments, Austin Wash Site, 48UT390, Uinta County, Wyoming. a-e, gravers; f-j, drill fragments

cross section and most evidence fine pressure flaking from reworking. Two of the tips are of chert and the other four are of chalcedony.

Blanks

A total of 46 complete or fragmentary bifaces are included in this category. Blanks are bifacially worked specimens that are thicker and more triangular than preforms. In general, they have an irregular outline which has not been reduced to a specific shape. The complete specimens measure from 30 to 50 mm in width and 50 to 80 mm in length. Algalitic chert and moss agate are the most common material types representing 65% of the total collection. Many of the bifaces probably functioned as tools and were end products in themselves even though the category blanks is one of the early stages of the lithic reduction sequence.

Preforms

This category, preforms, consists of 106 entire or fragmentary bifaces. The length of complete preforms ranges from 32 to 41 mm, however, most are incomplete and are probably small fragments of larger bifaces. Preforms are distinguished from blanks because they are generally thinner and have less mass and are more regularly flaked along the margins. Although some of these preforms might have represented one of the later stages of lithic reduction, it is more likely that most of these fragments represent pieces of end products or tools. The preforms are generally distinguished from the knives discussed above by having more mass and more irregular outline than the finished knives.

Some of the preforms are probably fragmentary distal tips and midsections of projectile points and knives. The preforms with complete bases are subrectangular and measure from 20 to 40 mm in width.

Material types represented by preforms include the full range at the site. However, more than half are of algalitic chert. The spatial distribution of preforms parallels the distribution of other bifacial artifacts and most are found concentrated in the southern end of the main excavation area near the features.

Unifaces

Scrapers

Scrapers are relatively formal tool types with evidence of unifacial retouch around the distal and/or lateral edges of the flake. A total of 104 unifacially worked artifacts were classified as scrapers (Figs. 25-27). Over 60 of these specimens are manufactured from bladelike flakes suggesting a fairly consistent process of production. Thirty-three scrapers retain a dorsal ridge on the blade. On two specimens' edges, retouch

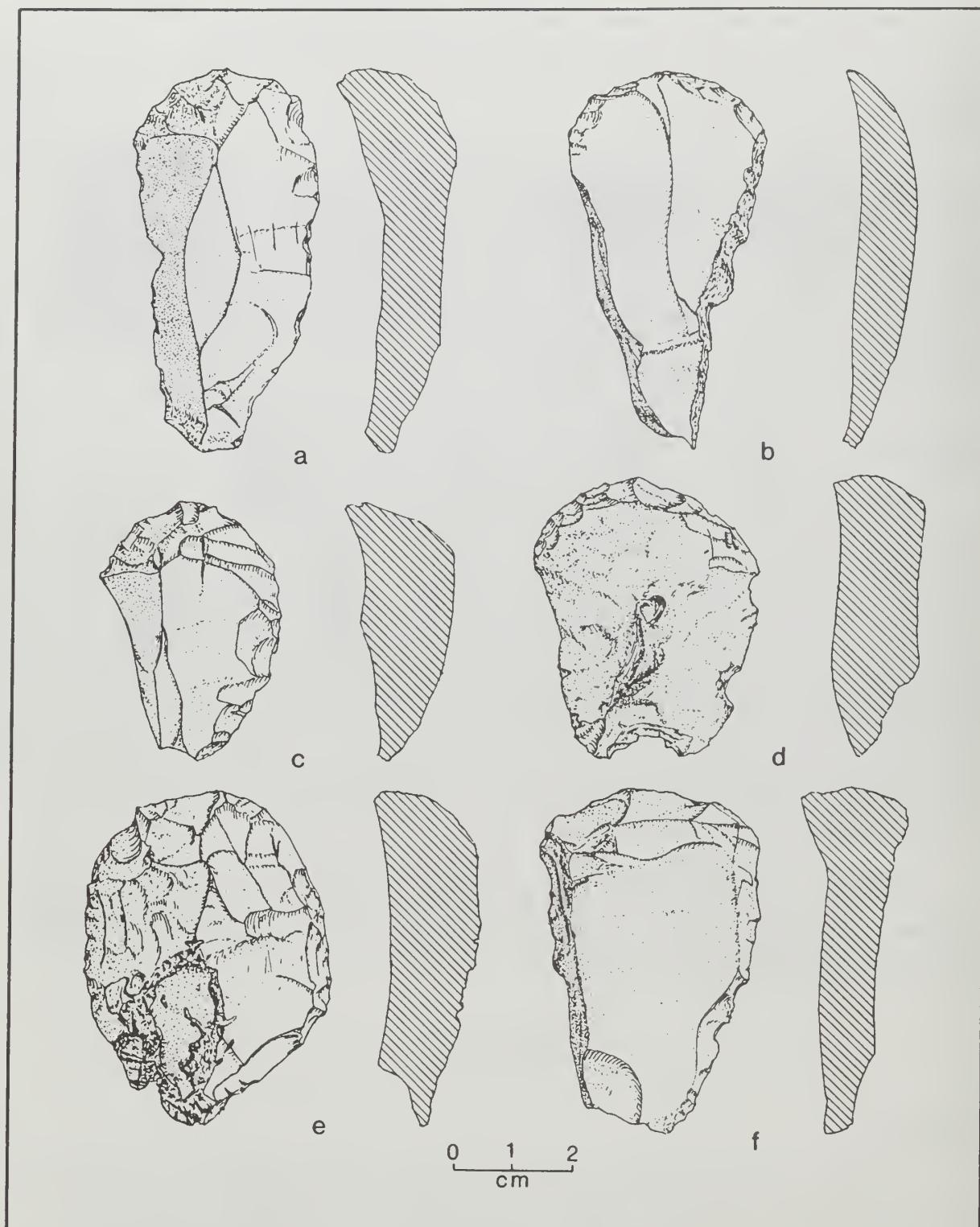


Fig. 25. Selected end scrapers, Austin Wash Site, 48UT390, Uinta County, Wyoming.

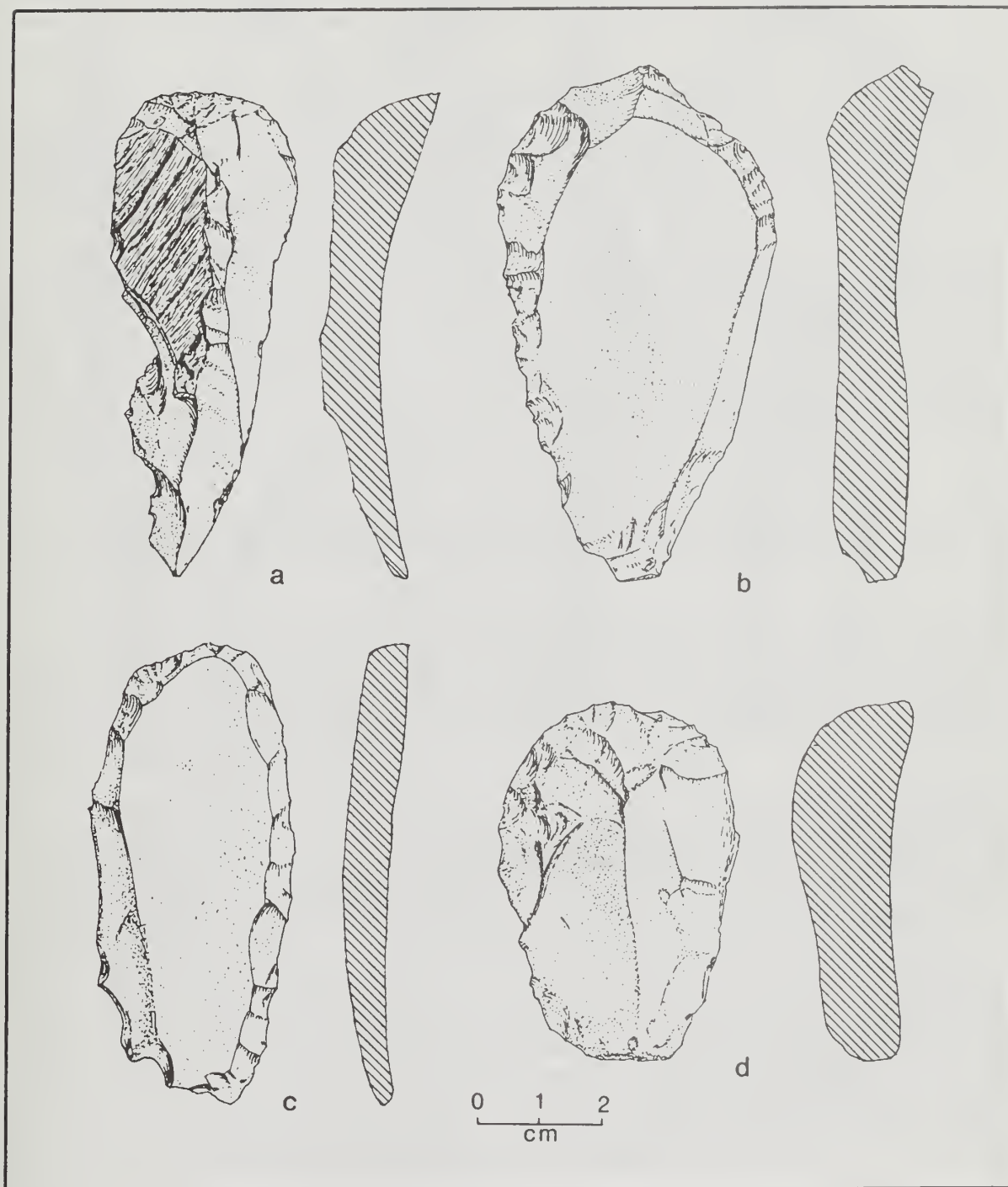


Fig. 26. Selected end scrapers, Austin Wash Site, 48TU390, Uinta County, Wyoming.

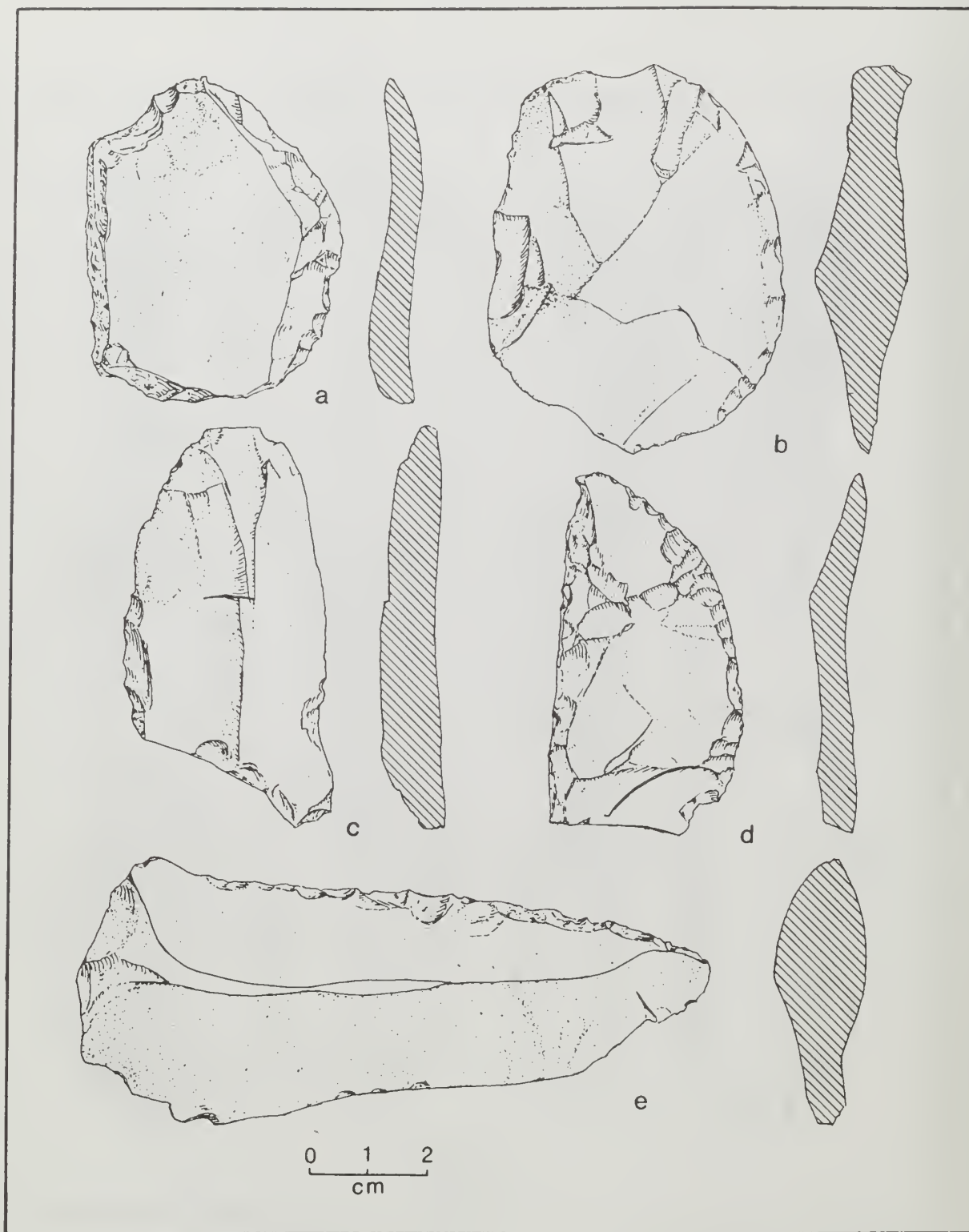


Fig. 27. Selected side scrapers, Austin Wash Site, 48UT390, Uinta County, Wyoming.

terminates at the large, single flake scar which is regular in outline suggesting that the dorsal ridge was removed after the edge was retouched. These bladelike flakes are rather robust and appear to be the result of a freehand percussion technique rather than the prepared core-punch technique.

Scrapers were classified by the position of the working edge. Working edges opposite the bulb of percussion were classified as end scrapers. Working edges adjacent to the bulb of percussion were classified as side scrapers. Working edges in both places on the same artifact were classified as side/end scrapers.

On 22 specimens (mostly bladelike flakes), thinning or a single notch is present slightly distal to the bulb of percussion. This is interpreted as a possible hafting element (Figs. 25b, d; 26a). Similar hafting elements are present on several more delicate blades which showed evidence of use and some minimal retouch. Evidence of hafting is more common on end and side/end scrapers but is also present on a few side scrapers. Although scrapers are most often made from bladelike flakes, they are also present in smaller numbers on core fragments, split cobble fragments, and in one case on the broken edge of a biface.

Approximately 70% (67) of the scrapers have no cortex present, while only seven specimens of the remaining 30% (29) have 50% cortex or more on the dorsal surface.

The size of the scrapers is relatively consistent with only a few very large and very small specimens in the collection. Length of the scrapers varies between 40 and 160 mm with a mean of 70 mm. Width ranges from 23 to 84 mm with a mean of 43 mm. Thickness measures between 6 and 35 mm with a mean of 14 mm. Only complete specimens were used in compiling maximum, minimum and mean measurement.

An overwhelming majority of scrapers, 78%, are made from algalitic chert. Seven are made from quartzite and the remaining 16 are manufactured from other kinds of chert and chalcedonies. The predominance of algalitic chert in this tool category and the abundance of algalitic chert in the debitage indicates that most, if not all, of these scrapers were manufactured on site.

In the main excavation area, 27 end scrapers, 28 side/end scrapers (Fig. 27d) and 29 side scrapers were recovered. Seventy-eight scrapers are clustered around the features with some slight differential distribution of end and side scrapers. End scrapers tend to be the most common in the eastern portion of the main excavation area while the side scrapers are more common in the western portion. Both are found together in the southwest portion of the main excavation area.

Gravers

Short, sturdy projections, which exhibited lamellar flake scars, were classified as gravers. These projections are formed by notching along a flake edge or slight modification of a fortuitous projection or the juncture of two faces of a truncated core or flake. Thirty-six gravers were recovered at the Austin Wash Site (Fig. 24).

Gravers were present on 26 modified flakes, nine cores and core fragments, and one end scraper. Twenty-nine gravers were on flakes, cores and core fragments which had other retouched edges.

The overall size of items upon which gravers were manufactured varies greatly. Length of pieces ranged from 22 to 148 mm, width from 20 to 85 mm and thickness from 5 to 45 mm. This large variation of size reflects a somewhat random selection of pieces for production of a graver. Although there is a wide range of sizes, 32 of the 36 gravers are of algalitic chert. Additionally there were three gravers of chalcedony and one of quartzite.

Of the 36 gravers, 33 were recovered within the main excavation area. None were found more than 2 m from features. The proximity to the features indicates that these tools are related to activities around the features. Functions inferred by these tools are cutting, perforating and scoring lines on bone during the production of beads.

Modified Flakes

Serrated Flakes

Nine flakes possessing retouch forming a series of projections or teeth relatively evenly spaced along an edge are classified as serrated flakes. On one, the teeth are formed by bifacial retouch while on the remaining eight, unifacial retouch was used to produce projections. Flake sizes vary from 19 to 92 mm in length, 19 to 61 mm in width and 5 to 20 mm in thickness.

Generally, these serrated flakes possess at least four projections on the working edge. Rounding of these projections is in some cases visible with the naked eye. Six are made from algalitic chert, with two of quartzite and one of banded chert. One serrated flake was a surface find but the other eight are all associated with the bone midden. Most of the specimens from the bone midden were recovered less than 1 m from a feature. The unifacial retouch of all but one specimen suggests scraping or shredding functions may have been successfully accomplished with such tools.

Notched Flakes

Thirty-eight specimens, including flakes and cores which possess small, unifacially retouched concavities, have been designated notched flakes. A large number of flakes were observed with small concavities but most appeared to be the result of fortuitous fracturing. Only specimens that exhibited at least three deliberate retouch flake scars were ultimately classified as notched flakes.

Retouched notches were found on specimens ranging from 25 to 80 mm in length. Two specimens had two notches on a single flake. The width of the notch opening ranged from 4 to 25 mm. Only nine notches were 10 mm in width or greater, while 27 notches measured less than 10 mm. Notches were found on 36 algalitic chert, one quartzite and one banded chert flake.

The vast majority of notched flakes were recovered within the main excavation within the bone midden. All but four of these notched flakes were within 2 m of the various features in this area, indicating they were an integral part of the activities in this area.

Similar tools are often designated as spokeshaves. However, the small size of the majority of notches suggests an entirely different function as does their close proximity to features. They may have been used to strip meat from bones but the exact nature of their function is problematic.

Other Modified Flakes

Due to the very large number of naturally edge-damaged flakes within the assemblage, a conservative approach was taken in identifying modified specimens. A modified flake was defined as a specimen which possessed at least four contiguous retouch flake scars covering at least 1 cm of the edge.

Of the 134 specimens classified as retouched flakes, 106 showed use dulling and rounding, 22 showed retouch only and six exhibited rounding, dulling and retouch. While the vast majority of these specimens are flakes and flake fragments, four core fragments are also present.

The size of flakes recovered varied from 17 to 106 mm in length, 12 to 116 mm in width and 2 to 23 mm in thickness. As with all the expedient tools, the material type is predominantly algalitic chert. Eighty-seven percent, 116, were of this material. Other materials present in the collection include cherts, quartzites, moss agate and chalcedony.

Of the 134 modified flakes recovered, 121 were recovered from the southern portion of the main excavation area. These tools are generally associated with cutting or scraping functions.

Bladelike Flakes

Although not all of these specimens fit the definition of a prismatic blade, at least twice as long as it is wide, most of these items approach this definition. Other than bladelike morphology, these artifacts were treated in a similar manner as the modified flakes. Thirty-two bladelike flakes were recovered. Most of the specimens exhibit only minimal retouch.

Blade lengths ranged from 30 to 90 mm, blade widths from 13 to 48 mm and blade thicknesses from 3 to 14 mm. At least six specimens appear to have been hafted. The hafting element consists of one or two notches placed at the proximal end of the flake near the striking platform. Notching on three of the hafted specimens is unusual. All three of these specimens are notched unifacially on alternate sides of the flake. All of the hafted implements are made from algalitic chert. Nonhafted specimens are predominantly algalitic chert, 22, the remaining of purple quartzite, Granger Green chert and chalcedony.

Distribution of this tool type is similar to that of the modified flakes. Only four specimens were excavated in units that were not adjacent to units with features. As with the utilized/modified flakes, cutting and scraping functions are suggested for these tools.

Core Tools, Cores and Cobbles

Choppers

Five bifacially reduced specimens at the blank stage of reduction, exhibiting heavy edge damage, are classified as choppers. These items include a flake, a core, two cobbles and a pebble. There is no similarity in morphology between these specimens which vary among round, oval and subrectangular. All choppers are made from algalitic chert. Four of the five specimens recovered were located within the main excavation area. Three of these four choppers were recovered from two adjacent units. The "heavy duty" tools (wedges, gouges and choppers) are all clustered around the Large Pit. As is the case with the wedges and gouges, choppers may have served as the heavy duty chopping and cutting tools used during the initial stages of meat processing.

Gouges

Six large, bifacially reduced cores are classified as gouges. These tools vary in outline from nearly round, ovate, oblong and subrectangular. Although the morphology of these tools differs greatly, the working edge is consistent from piece to piece. This unique working edge was the basis for classifying these artifacts as gouges. The working edges are beveled to an angle approximately 15 to 30° from perpendicular to the long axis. These gouges are slightly thicker near the top (opposite the working edge)

and taper gently toward the working edge. On the backside, this taper ends rather abruptly at the bevel. This bevel is formed by large, shallow flake scars on all six specimens (Fig. 28a-c).

Working edges on these tools are worn unifacially. Step fracturing is present on all working edges. On four specimens, large flake scars terminate at step fractures almost halfway up the height of the tool.

Most of these gouges are fairly robust. The thinnest specimen was recovered in two pieces in adjacent units. Length of these tools varied from 73 to 126 mm, width from 70 to 96 mm and thickness from 17 to 44 mm.

These gouges are all made from algalitic chert. All six gouges were recovered from the main excavation area. Although the function of these tools is not fully understood, the heavy edge damage indicates these robust tools were used on a hard substance, possibly bone.

Wedges

Six core fragments and bifacially reduced blanks, which have a battered flat surface opposite a battered working edge, are classified as wedges. The wedges range in length from 56 to 101 mm, width varies from 54 to 95 mm and thickness from 15 to 58 mm. These wedges have a triangular cross section with the battered edge on the distal end of the specimen (Fig. 28d-f). All of the wedges recovered are made from the abundant, locally available algalitic chert. Five of the six wedges were located in the main excavation area. All of these are in units or adjacent to units with features. The relatively robust morphology of the five specimens found within the bone bed, as well as damage on the poll and working edge, suggests that these tools were used to perform heavy duty tasks such as separating joints during the initial stages of butchering.

Modified Cobbles

Sixteen modified cobbles and pebbles were recovered at the Austin Wash Site. A variety of modifications, primarily bifacial or unifacial reduction, occur in the collection. More than one worked edge is present on one cobble and three pebbles. Both bifacial and unifacial modifications were noted on two pebbles. Specimens varied in length from 49 to 145 mm, width 48 to 82 mm and thickness from 13 to 38 mm. The predominant material used for these items is the quartzite cobbles and pebbles found throughout the area. All of the specimens were recovered within the main excavation area. These modified cobbles most likely represent tests for suitability for flaking rather than the manufacture of expedient tools.

Cores

Cores are defined here as any piece of raw material that exhibits three or more flake scars. Based upon the pattern of the flake removals,

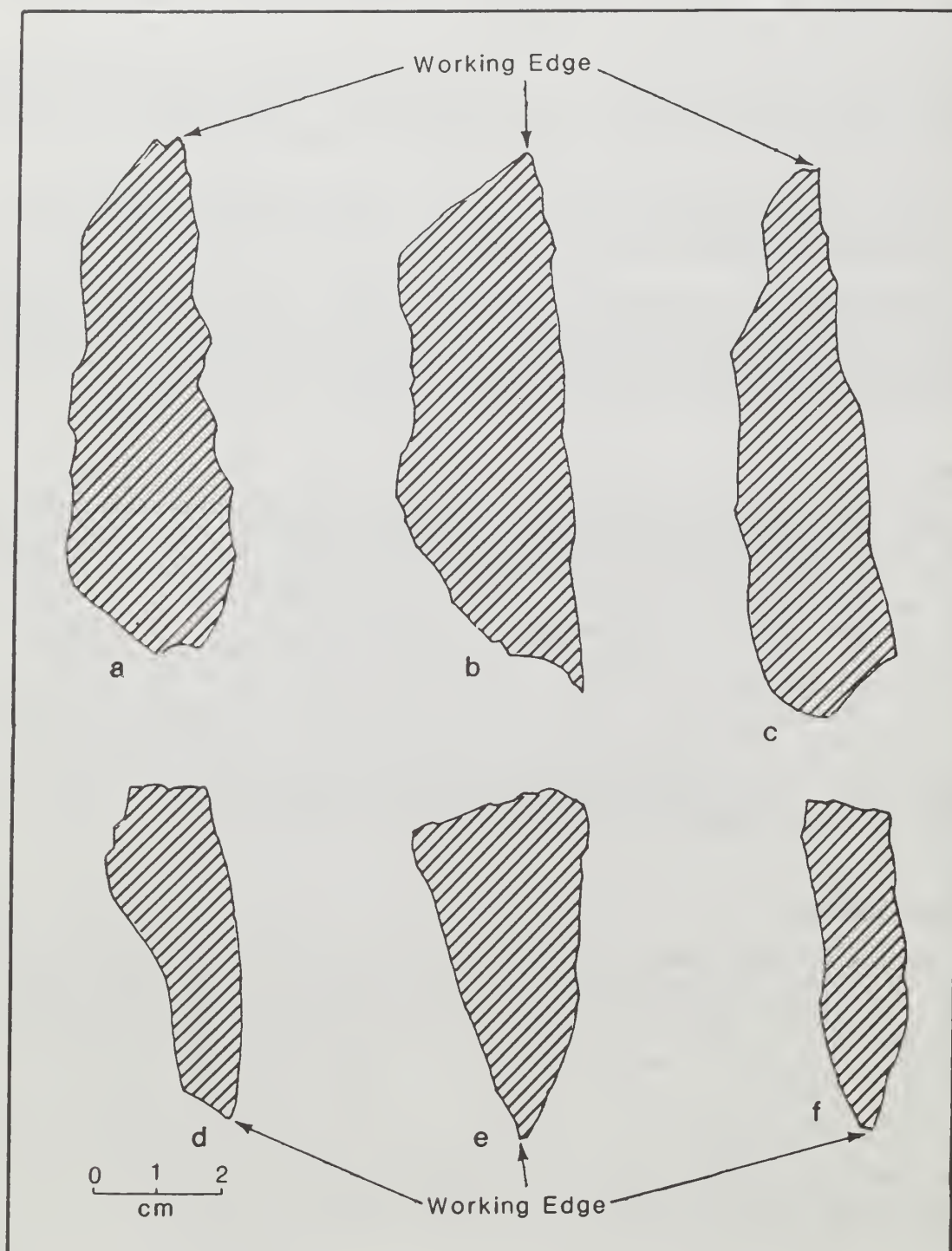


Fig. 28. Cross section of selected gouges (a-c) and wedges (d-f), Austin Wash Site, 48UT390, Uinta County, Wyoming.

reduction was assessed as bifacial, unifacial or random. Bifacial core reduction, the alternate removal of flakes from opposite sides of the core, is common, especially on pebbles and cobbles. Unifacial reduction, continued flake removal from a prepared platform, represents attempts to produce bladelike flakes. Other core reduction was classified as random (multidirectional). Size of cores is extremely variable, ranging from 31 to 149 mm in length, 18 to 110 mm in width and 17 to 76 mm thick. A total of 121 cores were recovered during the excavation.

A variety of material types are present in the cores collected from the Austin Wash Site. As is the case with most of the expedient tools, algalitic chert is the predominant material type, 66 cores were of this material. Moss agate is represented by 28 cores and quartzite by 12 with the remaining of other cherts and chalcedonies. The remaining cores include specimens of various cherts, chalcedonies and quartzite.

Generally, the moss agate and chalcedony cores are bifacially reduced pebble cores. By contrast, the algalitic chert cores are much larger and appear to be remnants of tabular chunks.

Cores are distributed in the main excavation area much the same as other tool categories around the features. For example, 102 cores were recovered in the block excavation. Cores are highly clustered in the main area. Seventy-seven cores were recovered from 27 1 by 1 m excavation units. This clustering of cores, particularly around features, indicates that many of the tools within the artifact collection were produced, used and discarded in the immediate area of the bone midden.

Debitage

Table 6 presents thedebitage sorted by reduction stage and material type. The relative frequencies of the raw material types is similar to that of the formal tool categories (Table 3); algalitic chert is the most common (60.9%), followed by moss agate (11.0%). The remainder of the collection is made up of quartzites (15.1%) and a variety of chalcedonies and cherts. Previous analysis has suggested marked contrasts in the raw material used for certain tools at this site (Sanders 1982). The present collection shows fewer projectile points manufactured of algalitic chert (23.7%) than of the chalcedonies (36.8%). However, it does not show a very exclusive separation of raw material by function as derived from tool type. In fact, a greater proportion of the tools (65.3%) than thedebitage is made up of algalitic chert. Testifying to algalitic chert's suitability for most tool types is the high frequency of knives, blanks and preforms, and its appearance in every tool category but modified cobble. We suggest that the frequent use of algalitic chert for tools, often termed "opportunistic", is less a function of the nature of the raw material and more a function of its abundance.

All of the reduction categories are represented for each raw material type except for those with very small sample sizes. Secondary and final thinning flakes are the most common forms which correspond to the predomi-

nance of medium-small and small flakes (Table 7). While decortication flakes are the least common for each raw material type, there is significant variation among the relative frequencies by raw material type, particularly between the algalitic chert and moss agate. Only 2.6% of the algalitic chert debitage is decortication flakes as compared to 10.0% for the moss agate. This observation may be related to the nature of the primary material. As noted in the discussion of cores, the algalitic chert occurs in large tabular chunks while the moss agate is represented by smaller, bifacially reduced pebble cores. The frequency of algalitic chert decortication flakes would thus be lower relative to the flakes produced from a greater interior mass.

Pecked and Ground Stone Artifacts

Hammerstones

Class I

Four elongated, water-worn cobbles, exhibiting battering on the extreme ends on the longitudinal axis of the artifact, were classified as Class I hammerstones. These specimens range in length from 13.5 to 19.0 cm, 3 to 6 cm in width, 2.5 to 4.5 cm in thickness and the weight ranges from 219 to 891 g. Two specimens are battered on both ends while the remaining two are utilized on one end (Fig. 29). Material types include two fine-grained quartzite, one very coarse-grained quartzite and one cherty limestone. None of these specimens show evidence of thermal alteration or fire blackening.

Class II

Three round to ovoid cobbles exhibiting battering and flake scars are categorized as Class II hammerstones. Specimens in this class range from 8 to 13 cm in length, 4.5 to 9.0 cm in width, 2 to 6 cm in thickness and weigh between 243 and 875 g. One of these specimens exhibits battering on opposing ends similar to the battering on opposing ends of the Class I hammerstones. Another hammerstone in this class shows a narrow band of continuous battering and pecking around 40% of the circumference. The third specimen in this class shows minimal battering on a somewhat pointed end. All of these hammerstones exhibit fire blackening.

A relatively small number of hammerstones are represented in this assemblage relative to the quantity of debitage, cores and tools. This is in part the result of the difficulty in identifying hammerstones in the field from the myriad of whole, cracked and fragmented, generally fire-blackened, cobbles strewn throughout the cultural deposits. Of the six hammerstones collected, only one Class I hammerstone is not from the block area of excavation. Four of the other five hammerstones are located in the heaviest concentrations of lithic debris near the Large Pit. The distribution of debitage, cores and hammerstones demonstrates that much of the lithic reduction at the site took place near the Large Pit.

Table 7. Frequency of debitage by size and material type,
Austin Wash Site, 48UT390, Uinta County, Wyoming.

Size	Quartzite			Chalcedony			Chert						Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algaittic	Solid Brown	Solid Other	Mottled/Speckled	Other	Obsidian
Large	50	10	20	1	0	7	0	45	0	1	0	0	0
Medium-large	55	18	58	4	2	17	0	72	0	0	1	0	0
Medium	158	39	276	39	8	69	1	226	4	1	4	0	2
Medium-small	508	152	1428	471	65	161	2	867	19	14	24	0	3
Small	176	65	587	321	64	78	1	355	11	18	8	0	1
Total	947	284	2369	836	139	332	4	1565	34	34	37	0	6
													6587

* Data derived from examination of debitage from a 10% random sample of 1 by 1 m units selected from the major block excavation.

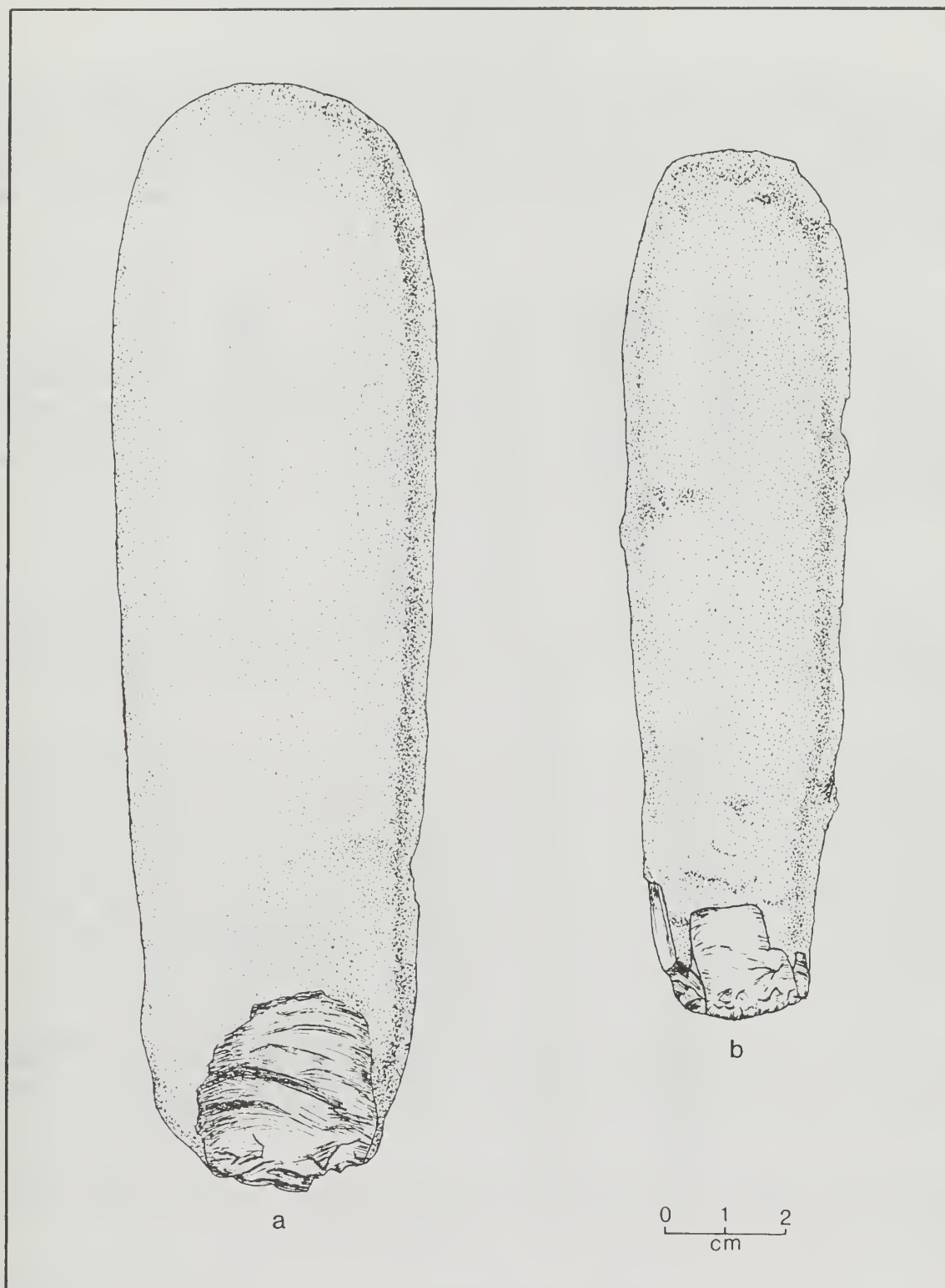


Fig. 29. Selected Class I hammerstones, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Grooved Abrader

One grooved abrader was recovered from the main excavation block. This abrader is on a medium-grained quartzite cobble which exhibits fire blackening. However, in the area of the groove, the blackening is absent suggesting its modification subsequent to the blackening. The groove is 1.5 cm at its greatest width and 4 cm in length. The specimen is 9.5 cm long, 7.0 cm wide, 5.5 cm thick and weighs 783 g.

Metate Fragment

Only one metate fragment made from medium-grained quartzite was recorded during the excavation. The specimen appears to be a portion of the metate edge which has been dressed by flaking and pecking. The overall lack of grinding implements in the areas excavated indicates a lack of extensive exploitation of wild plant resources during the occupation of the site, although some charred seeds were recovered (see below).

Bead

A single, small, dark, circular stone bead was recovered about 50 cm northwest of the Large Pit (Fig. 30). This bead was circular with a diameter of 7.8 mm and a thickness of 1.2 mm. The diameter of the hole is 1.8 mm.

In order to identify the source of lithic material of the stone bead, a nondestructive comparison of the density of the stone bead material with samples of lignite, steatite and tar sand was conducted. Table 8 shows the results of the density tests. The material of the stone bead has a density of 1.7 g per cm³. The density of the stone bead did not compare with the lignite, steatite or tar sand, indicating that it was some other material (Table 8). Comparison of the density with other material, such as anthracite (density of 1.32-1.72 g per cm³), bituminous coal (1.14-1.40 g per cm³) and gilsonite (1.065-1.070 g per cm³) failed to identify the material of the stone bead.

Further examination of the bead under high magnification demonstrated that small, minute fossils were included in the stone material. These fossils seem to indicate that the stone bead is made of a dark, fossiliferous limestone. The source of this limestone is unknown.

This was the only stone bead found on the site, although some of the worked bone indicates that the prehistoric occupants at the Austin Wash Site were possibly manufacturing bone beads.

Quartz Crystal

A single battered quartz crystal (Fig. 30), 18 mm in length and 9 mm in diameter, was collected from the surface of this site about 40 m to the



Fig. 30. Bone awls, stone bead, quartz crystal and bone fleshers 48UT390, Uinta County, Wyoming. a-e, awls; f, bead; g, quartz crystal; h-j, fleshers

Table 8. Density of bead and selected materials,
48UT390, Uinta County, Wyoming.

Variable	Bead	Lignite	Steatite	Tar Sand
Weight (g)	.11	1.12	28.22	238.95
Volume (cc)	.065 \pm .007	875 \pm .013	10.477 \pm .013	114.9 \pm .001
Density (measured)	1.70	1.27	2.70	2.08

south of the main excavation area. Because quartz crystals do not occur naturally in the immediate site area, this crystal may be a cultural artifact.

Quartz crystals are known to have had magico-religious significance in ethnographic groups in the Southwest, Great Basin and California. Hull (1980:142) describes a prehistoric medicine bundle and bag that was collected in northern Arizona which contained a quartz crystal. The bag also had a bundle of feathers and a variety of other items considered to be exotic and nonutilitarian.

Worked Bone Artifacts

Twenty-one intentionally modified bone fragments, seven awls, four scraping/fleshing tools and ten bones with grooves or scoring were recovered during the excavation at the site. All were found near the bone bed in the southern portion of the main excavation area.

Bone Awls

Seven bone awls were recovered from the southern portion of the bone bed (Table 9). The awls are antelope or large mammal long bone shaft fragments that have one end ground to an abrupt tapered tip (Fig. 30) and range from 8.2 to 15.2 cm in length. Two awls are from metacarpals, one is from a tibia and the other four are from unidentifiable long bones.

Scraping/Fleshing Tools

Four expedient bone tools found near the bone bed are included in this category (Table 9). One is an antelope metapodial fragment that exhibits slight polishing on the broken distal end (Fig. 30). It is 14 cm long. Another one is an anterior shaft fragment of an antelope femur with polishing on the interior surface of the proximal end (Fig. 30). It is 8.9

Table 9. Characteristics of bone tools, Austin Wash Site, 48UT390, Uinta County, Wyoming.

University of Wyoming Museum Number	Tool Type	Taxon	Element	Portion	Length (cm)	Taper Angle of Tip	Type and Location of Finishing
1394	awl	antelope	right tibia	anterior, lateral mid-shaft	15.2	17.0°	diagonal grinding, proximal end
1395	awl	large mammal	long bone	shaft	14.3	9.0°	diagonal grinding (largely obliterated by polishing and plant-root scars), one end
1396	awl	antelope	left metatarsal	proximal, lateral anterior shaft	8.2	18.0°	diagonal grinding, distal end
1397	awl	antelope	right metacarpal	proximal, end and shaft	9.8	19.0°	transverse grinding, distal end
1398	awl	large mammal	long bone	shaft	11.4	12.0°	diagonal grinding, one end
1399	awl	large mammal	long bone	shaft	9.0	11.5°	diagonal and transverse grinding, one end
2194	awl	large mammal	long bone	shaft	12.5	12.0°	diagonal and transverse grinding, one end
1405	scraper/ flesher	antelope	left femur	middle and distal anterior shaft	8.9	---	interior surface of proximal end highly polished, blunt edge on working face
1406	scraper/ flesher	antelope	metapodial	proximal end and shaft	15.0	---	bone flakes removed from exterior edge of concave spiral fracture to one side
1606	scraper/ flesher	large mammal	long bone	shaft	12.0	---	polishing on several surfaces
2196	scraper/ flesher	antelope	radius	proximal end	20.5	---	polishing along shaft
1605	incised bone/ whistle?	jackrabbit	right femur	posterior mid-shaft	2.4	---	transverse incision 0.1 cm wide on poste- rior face; broken during manufacture?
1400	remnant of bone, tube production	antelope	first phalanx	proximal half	2.0	---	groove cut around circumference of proximal shaft, transverse to long axis, then snapped off
1401	remnant of bone, tube production	antelope	first phalanx	distal half	2.2	---	grooves cut on distal shaft, transverse to long axis, then snapped off

Table 9. Continued.

University of Wyoming Museum Number	Tool Type	Taxon	Element	Portion	Length (cm)	Taper Angle of Tip	Type and Location of Finishing
1402	remnant of bone, tube production?	medium mammal	metapodial	proximal end	1.2	---	groove cut around circumference of proximal shaft, transverse to long axis, then snapped off
1403	remnant of bone, tube production?	antelope	left first phalanx	proximal half	2.0	---	groove cut around circumference of mid- shaft, transverse to long axis, then snapped off
1404	remnant of bone, tube production?	coyote/ dog	right humerus	distal end and shaft	5.0	---	groove cut around circumference of distal shaft, transverse to long axis, then snapped off. Grinding striations on exterior surfaces parallel to long axis
1611	remnant of bone, tube production	coyote/ dog	metapodial	proximal end	2.5	---	groove cut around the circumferences of proximal shaft, transverse to long axis, then snapped off; highly weathered
2195	remnant of bone, tube production	coyote/ dog	phalanx	distal half	0.9	---	groove cut around circumference of distal shaft, transverse to long axis, then snapped off
2197	remnant of bone, tube production	coyote/ dog	left tibia	distal end and shaft	2.5	---	groove cut around circumference of distal shaft, transverse to long axis, then snapped off
2198	remnant of bone, tube production	coyote/ dog	left tibia	proximal end and shaft	4.8	---	groove cut around circumference of proximal shaft, transverse to long axis, then snapped off

cm long and is about 1.0 cm wide at the polished end. The other two are long bone fragments that exhibit slight wear and polishing. All are expedient tools that were used after the bone was broken for marrow extraction. They were probably used for processing soft materials such as hides.

Other Modified Bone

Ten other bone fragments associated with the bone bed exhibited intentional modification (Table 10). Nine specimens may be fragments resulting from bone bead or bone tube production. The end of these bones were snapped off by cutting transverse grooves around the shaft. They include a coyote/dog humerus (Fig. 31a), an antelope first phalanx (Fig. 31b), a metapodial from a medium-sized mammal (Fig. 31c), two coyote/dog tibia fragments, one coyote/dog metapodial, a coyote/dog phalanx and an antelope first phalanx. The antelope humerus also contains grinding striations and four shallow transverse grooves near the end that was snapped off. The tenth specimen is a posterior midshaft fragment of a jackrabbit femur that has a 0.1 wide transverse incision (Fig. 31d). A small hole is in the center of the cut. This may be a "whistle" fragment that was broken during manufacture.

Faunal Analysis

The 1983 excavations at the Austin Wash Site recovered over 16,000 bone specimens (Table 10). Nine taxa, including bison, antelope, coyote or dog, jackrabbit, cottontail, prairie dog, ground squirrel, pocket gopher and vole, were recovered. The bulk of the collection appears to represent the remains of at least 15 antelope. Bison and jackrabbit are represented by a minimum of two individuals each, and each of the remaining taxa is represented by one individual.

The most striking characteristic of the collection is its fragmentary nature. It seems that the prehistoric occupants of the site were processing the skeletal remains for both marrow and bone grease (Vehik 1977). Given the broken and crushed nature of the specimens, it is not surprising that about a third of the collection is totally unidentifiable and another 50% can only be assigned to gross size categories of large, medium or small mammals. Less than 12% (2021) of the specimens can be identified to genus or species.

The results of this faunal analysis support almost all of the interpretations that Reiss and Walker (1982) presented for the Austin Wash Site based on their analysis of a limited amount of faunal remains from the previous testing of the site. Each of their interpretations will be reviewed below.

First, the genera recovered in 1983 represent the same taxa identified by Reiss and Walker with the exception of the frog or toad. No amphibian bones were recovered in 1983.

Table 10. Faunal remains from the Austin Wash Site, 48UT390, Uinta County, Wyoming.

Taxa	NISP	MNI
Bison (<u>Bison bison</u>)	99	2
Very large mammal	50	0
Antelope (<u>Antilocapra americana</u>)	1880	15
Large mammal	9208	0
Coyote/dog	6	1
Jackrabbit (<u>Lepus townsendii</u>)	33	2
Medium mammal	9	0
Cottontail (<u>Sylvilagus</u> sp.)	1	1
Prairie dog (<u>Cynomys leucurus</u>)	6	1
Ground squirrel (<u>Spermophilus</u> spp.)	4	1
Pocket gopher (<u>Thomomys talpoides</u>)	3	1
Vole (<u>Microtus</u> sp. or <u>Lagurus</u> sp.)	2	1
Small mammal	1	0
Unidentifiable	5209	0
Total	16511	25

NOTE: NISP = Number of Individual Species per Taxon; MNI = Minimum Number of Individuals.

Second, antelope bone again dominates the collection. Ninety-three percent of the identifiable specimens were antelope (Table 10). While over half the collection was assigned to the "large mammal" category, in all likelihood, these too are antelope specimens, particularly in light of the fact that a minimum of 15 antelope are represented in the main excavation area. Reiss and Walker (1982:9) present several hypotheses for the lack of the full range of antelope elements in their collection. It is now clear, however, that the lack of vertebrae and ribs in the 1980-1981 tests was a

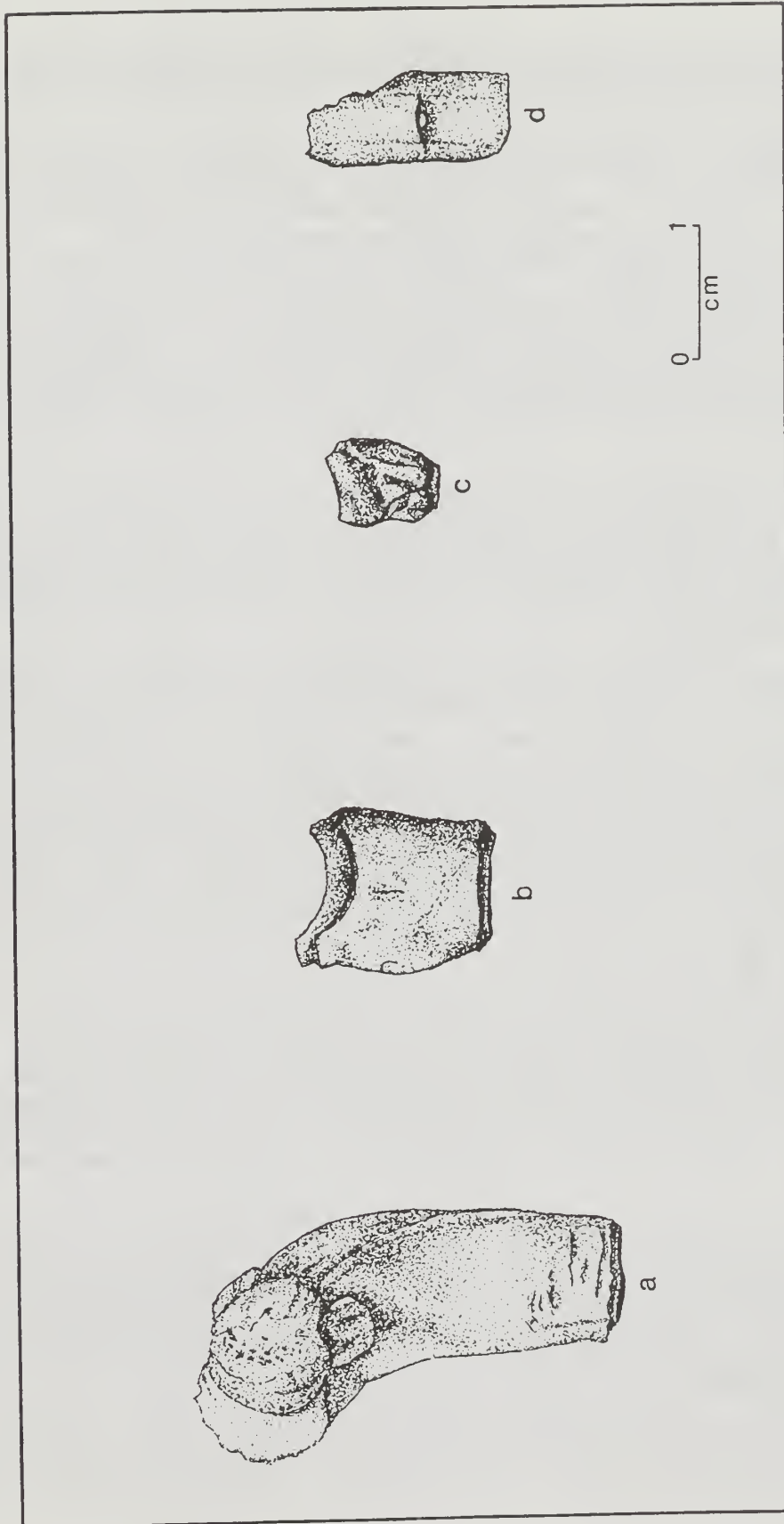


Fig. 31. Selected worked bone fragments, Austin Wash Site, 48UT390, Uinta County, Wyoming (twice natural size). a, coyote/dog humerus; b, antelope first phalanx; c, metapodial (medium-sized mammal); d, jackrabbit femur

result of the limited area sampled. All antelope skeletal elements, including vertebrae and ribs, were recorded in the 1983 collection, albeit, almost none of them complete.

Third, the fragmentary nature of the collection parallels that from the previous testing. Less than 5% of the antelope specimens represents complete elements. Complete antelope bones are represented by 29 tarsals and carpals, 19 sesamoids, 18 third phalanges (12 left, six right), 12 astraguli (nine left, three right), four first ribs, two left patella, two cubo-naviculars and one each of a calcaneum, an atlas, cervical and thoracic vertebrae. Not one antelope long bone was found complete and intact. In fact, the shafts and articular ends of the long bones were so thoroughly broken that they could not be used for the determination of the minimum number of individuals. The minimum individual count for antelope was based on 15 whole and partially reconstructable left astraguli.

The antelope phalanges from the 1983 collection were also broken and processed. More than 150 phalange fragments were identified, 10% of which represent the first phalanx that was split longitudinally. It appears that the prehistoric occupants of the Austin Wash Site were maximizing bone marrow extraction. Several of the recovered bison phalanges were similarly split for marrow.

Fourth, the cut marks on the 1983 bone collection duplicate those identified on bones from the 1980-1981 testing. Cut marks were most frequently found on rib fragments. Long, longitudinal cuts were observed on the ventral surface of the ribs. Additionally, cut marks were observed on several first and second phalanges, possibly resulting from skinning (Reiss and Walker 1982:15). The hide processing hypothesis is definitely supported by the frequency of scrapers recovered at the site. Most of the other major bones, including the scapula, humerus, radius, femur, pelvis and vertebrae, exhibit some cut marks. Several antelope horn cores appear to have been cut or sawed off at the base, probably to obtain the antler for tool use.

Bison and canids are the only other taxa that evidence cut marks. Again, the ventral side of the bison ribs exhibited the most cut marks, although fragments of a bison tibia, humerus and tarsal also had butchering marks. The canid specimens are unique; five of the six specimens were purposefully modified for bone bead or tube production (see Worked Bone above). Only one spiral fractured canid metapodial fragment was not cut.

Fifth, the few mandible fragments recovered with an intact M_3 support Reiss and Walker's (1982:17) supposition that the site was occupied in late fall/early winter. The plant macrofossil data presented below suggests a late summer/early fall occupation. It would seem, based on all of the artifactual data, that the site represents a fall antelope processing locale. The complete carcass utilization may reflect preparations for the upcoming winter.

Sixth, the pulverized nature of the bones from the main excavation area, particularly near the Large Pit, suggest that not only marrow

extraction, but bone grease production took place at the site. The bulk of the unidentifiable fragments were recovered from excavations units between the Large Pit and Rock-filled Firepit 2 and Special Use Pits 1, 3 and 4. It is possible that the Special Use Pits were used in the production of bone grease. Fig. 32 displays the concentration of bone fragments and thermally altered rock in the main excavation area.

Seventh, only about 6% (917) of the collection is burned. This is very similar to the 5% noted by Reiss and Walker. This low percentage of burned bone supports the bone grease processing hypothesis. There is no immediate explanation for the fact that the majority of the burned bone consists of very small unidentifiable fragments. Few of the large identifiable antelope bone fragments are burned. Also, with the exception of one jackrabbit metatarsal, none of the other bones identifiable to taxa are burned.

Clearly, the prehistoric occupants of the Austin Wash Site had trapped and killed at least 15 antelope for hides, meat, bone marrow and grease. The distribution of bones, location of cut marks and the pulverized nature of the bison specimens indicates that at least two bison were also processed in a similar manner at the same time. Five of the six canid specimens are fragments that have been purposefully cut. The lack of other canid fragments in the collection suggests that these bones were brought to the site for modification and that the canid was not killed or processed as the bison and antelope.

The presence of several complete skulls, the lack of burning and cut marks on specimens from the other identified taxa, particularly the rodents, suggests that these animals were not utilized by the prehistoric occupants of the site, but rather most likely result from the post-occupational intrusion into the deposits by nesting.

The distribution, kind and condition of the faunal remains at the site clearly demonstrate that this area of the Austin Wash Site was a Late Prehistoric antelope processing site. The bone data indicates complete utilization of the carcass for meat, hides, marrow and bone grease. At least two bison were also processed in a similar manner. Canid bone appears to have been favored for making bone tubes or beads, and the smaller mammals are, for the most part, intrusive.

Plant Macrofossil Analysis

Eleven samples, including postholes, rock-filled firepits, special use pits, the Large Pit and a bulk sample, were processed and examined for charred plant macrofossils. A total of 153 charred seeds were recovered from eight of these samples (Table 11). These seeds consist of goosefoot (Chenopodium sp.), strawberry (Frageria sp.), peppergrass (Lepidum sp.) and an unknown taxa. Only one goosefoot seed was found in one of the three posthole samples. There appears to be no discernible difference in the distribution of seeds among the rock-filled firepits, the special use pits

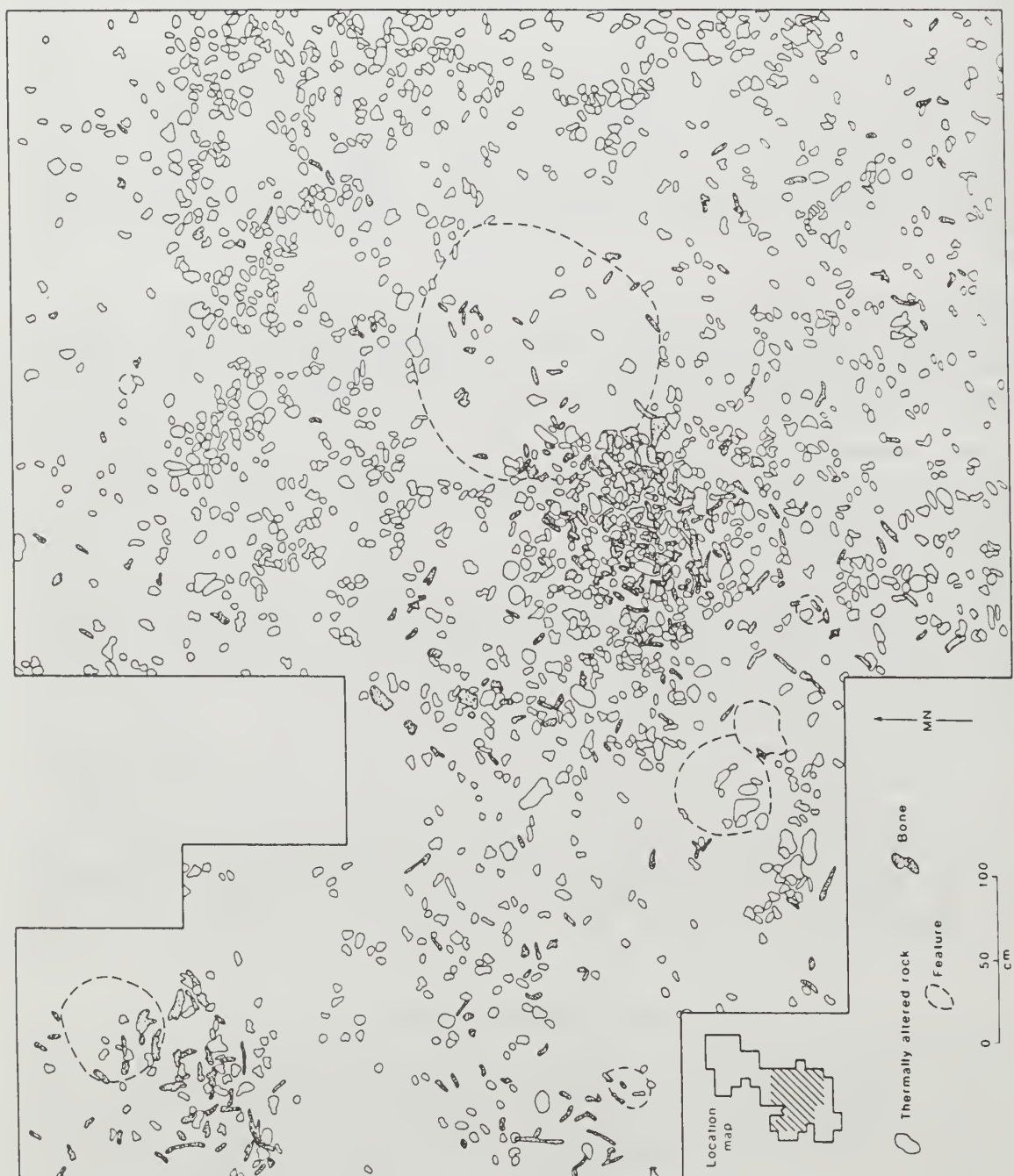


Fig. 32. Distribution of bone and thermally altered rocks in main excavation area, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Table 11. Distribution of charred seeds at the Austin Wash Site, 48UT390, Uinta County, Wyoming.

Sample	<u>Chenopodium</u>	<u>Frageria</u>	<u>Lepidum</u>	Unknown	Total
Posthole 1					0
Posthole 2	1				1
Posthole 4					0
Rock-filled Firepit 1					0
Rock-filled Firepit 2	7	9	2		18
Rock-filled Firepit 3	2	3			5
Rock-filled Firepit 5	6	4			10
Large Pit	16	17	2	1	36
Special Use Pit 3	24	20	7	2	53
Special Use Pit 4	7	3	3		13
Bulk Sample	2	14	1		17
Total	65	70	15	3	153

and the large pit. The presence of strawberry and goosefoot suggests that the site was occupied during the summer or early fall.

Spatial Distribution of Artifacts

One of the goals of excavating a block area at this site is to determine whether individual activity areas could be identified. Hodder and Orton (1976) discuss a number of techniques for analyzing spatial distribution of artifacts. One such technique, trend surface analysis (Hodder and Orton 1976:155), smooths the data and extracts differential spatial trends in the distribution of artifacts.

We used a 4 m² averaging method to provide a trend surface analysis of several of the major classes of artifacts, bifaces, scrapers, cores and debitage. The frequency per square meter of bifaces, scrapers and cores is presented in Fig. 33. Fig. 33d displays the spatial distribution of debitage in terms of weight per square meter. These maps all demonstrate that the bulk of these artifact classes occurs in the southern portion of the main excavation area. It is in this area that the main bone concentration was excavated and almost all of the features, with the exception of postholes, were recovered.

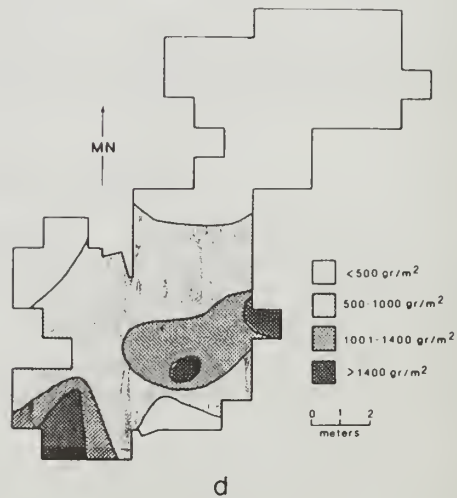
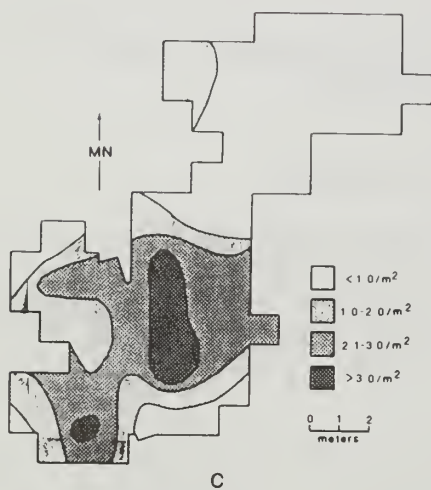
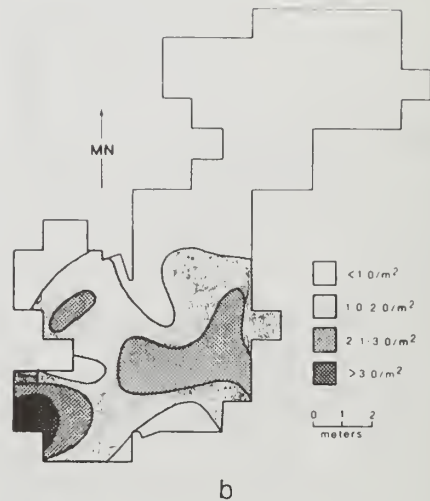
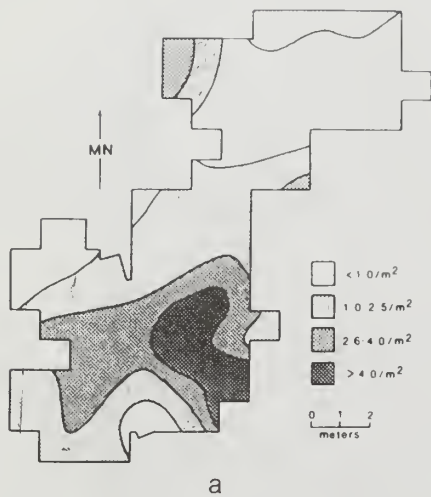


Fig. 33. Horizontal distribution of artifacts per m^2 , Austin Wash Site, 48UT390, Uinta County, Wyoming. a, bifaces; b, scrapers; c, cores; d, debitage weight

Fig. 34 shows a distribution of the main concentrations for each of these classes of artifacts in relation to the location of the features that were at the site. Inspection of these maps reveals that reduction of cores for the manufacture of tools is taking place in two areas. The first area is near the Large Pit in the center of the main excavation. Here, cores, debitage and bifaces are all concentrated. The second area of reduction is in the southwest corner of the excavation area where cores, debitage and scrapers are found to occur together. This co-occurrence is not surprising given the fact that the bulk of the cores and debitage were of algalitic chert, as were most of the expedient tools including scrapers. Thus, these distributional maps provide another line of evidence that show that the expedient tools, most of them unifaces and modified flakes, were manufactured on-site as the need arose. The highest concentrations of stone artifacts correlate directly with the distribution of the bone specimens and thermally altered rock (see Fig. 32).

These trend surface analyses do not specifically indicate that there were multiple activity loci in the area of the site excavated. Analysis of the radiocarbon dates (see below), the distribution of the artifacts and the faunal remains, and the cohesiveness of the artifact assemblage all indicate that the main excavation area represents a single, short-term antelope processing locale.

Summary and Conclusions

The Austin Wash Site is a multicomponent site radiocarbon dated to the Middle/Late Archaic and the Late Prehistoric (Table 12). Heaviest use of this site, however, appears to have occurred during the Late Prehistoric period. The earliest date at the site, 3030 ± 70 years:1080 B.C., is associated with a feature approximately 300 m southwest of the bone midden. Although the date presents Middle/Late Archaic transition, no diagnostic artifacts were recovered. Another date, 1740 ± 60 years:A.D. 210, representing the end of the Late Archaic period, was obtained from a rock-filled firepit approximately 25 m northwest of the main excavation area. Again, no diagnostic artifacts were associated with this feature.

These two early dates are statistically separated from each other and from the other dates associated with the Late Prehistoric occupation at the site (Table 12). A t-test was used to compare each chronologically adjacent set of dates from the site and is noted in the table. The two earliest dates from the site seem to represent separate occupations.

An analysis of the variance test of the remaining six radiocarbon dates gives an F value of 2.06, which is not significant at the 0.05 level. The t-test between chronologically adjacent pairs of dates is not significant, supporting the findings of the analysis of the variance test. These tests demonstrate that in a statistical sense, the latest six dates can be considered representative of a single, Late Prehistoric occupation at the site. Using the procedures for averaging radiocarbon dates (Long and Rippeteau 1974), a tree-ring corrected date for the Late Prehistoric occupation at the site is A.D. 763 ± 31 . We computed another estimated date of

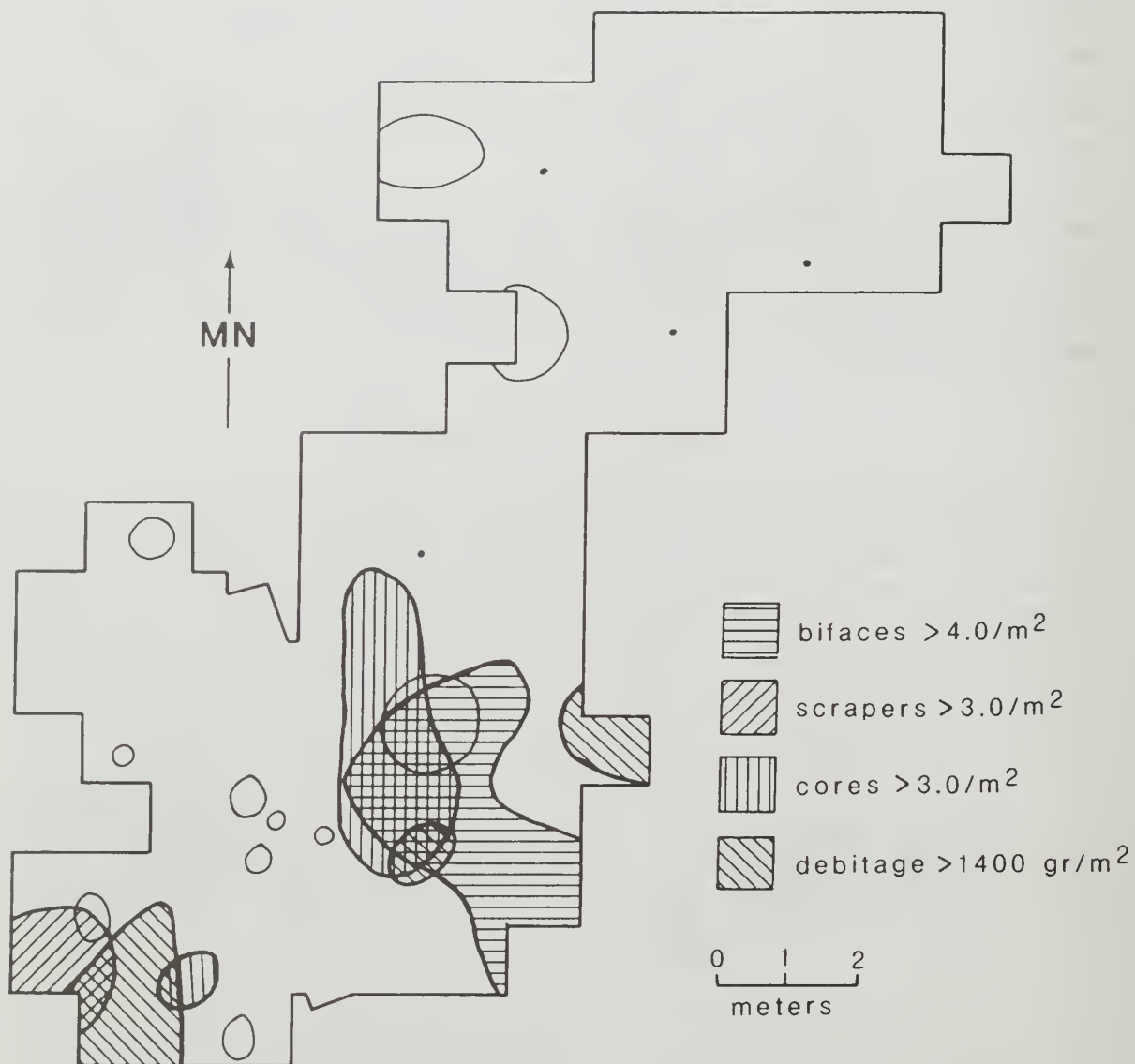


Fig. 34. Horizontal distribution of the main concentration of bifaces, scrapers, cores and debitage per m^2 , Austin Wash Site, 48UT390, Uinta County, Wyoming.

Table 12. Radiocarbon dates, Austin Wash Site, 48UT390, Uinta County, Wyoming.

Sample Location	Laboratory Number	Radiocarbon Years B.P. (Radiocarbon Years B.C./A.D.) ¹	Tree Ring Corrected Years B.C./A.D. ²	t Values for Temporally Adjacent Dates ³
Excavation Unit 6 ⁴	Beta 2445	3030 ± 120 (1080 B.C.)	1330 ± 130 B.C.	10.50*
Excavation Unit 11 ⁴	Beta 3324	1740 ± 60 (A.D. 210)	A.D. 220 ± 70	4.12*
Rock-filled Firepit	Beta 7271	1370 ± 60 (A.D. 580)	A.D. 600 ± 60	1.20
Bone Midden Matrix	Beta 7272	1250 ± 60 (A.D. 700)	A.D. 720 ± 80	.84
Rock-filled Firepit	Beta 7273	1160 ± 50 (A.D. 790)	A.D. 810 ± 70	.18
Excavation Unit 16 ⁴	Beta 3325	1140 ± 80 (A.D. 810)	A.D. 830 ± 90	.31
Excavation Unit 5 ⁴	Beta 2444	1100 ± 70 (A.D. 850)	A.D. 870 ± 90	.24
Large Pit	Beta 7274	1070 ± 80 (A.D. 880)	A.D. 900 ± 90	

Average Date for most recent six dates: A.D. 763 ± 31.

* $p > .05$, d.f. = ∞.

- 1 Half-life = 5568 years (Radiocarbon years B.C. = Radiocarbon years ago - 1950).
- 2 Tree Ring corrected dates interpolated from radiocarbon dating correction table in Damon et al. (1974).
- 3 t test for each pair of chronologically adjacent dates (cf. Long and Rippeteau 1974).
- 4 1981 excavations dates (Metcalf and Anderson 1982b; Reiss and Walker 1982).

occupation for the Late Prehistoric component at this site by eliminating the earliest and the latest of these six dates. An average of the remaining intermediate dates produces an occupation at A.D. 809 \pm 37. Given these radiocarbon dates and the statistical tests, we are relatively certain that the Late Prehistoric occupation at the Austin Wash Site occurred sometime towards the end of the eighth century or early ninth century A.D. Based on the radiocarbon dates, it appears that the site was occupied at least three different times; once in a transitional period from the Middle Archaic to Late Archaic, the second towards the end of the Late Archaic period and finally, during the middle of the Late Prehistoric period.

Three prehistoric occupations are indicated by the radiocarbon dates, but the site itself does not contain stratified cultural deposits. All of the buried cultural material at the site occurred in colluvial soils that were no deeper than 40 cm below the present ground surface. The data recovery program for this site focused on the excavation area of the bone midden. The midden itself was a homogeneous, dark organic and charcoal stained area with many flake stone tools, debitage, bone fragments and thermally altered rock. Although several projectile points associated with earlier periods were recovered in the bone midden, the relative contemporaneity of the radiocarbon dates from this area, as well as the cohesive artifact assemblage and a large collection of Rose Spring points, clearly indicates that the bone midden area is a Late Prehistoric component. Analysis of the faunal remains indicated that at least 15 antelope and two bison were the primary animals processed at the site, although rabbits and a variety of other small mammals were also included in the faunal assemblage. A handful of worked bone including awls, scrapers/fleshers and possible remnants of bone bead production were also recovered.

The chipped stone artifact assemblage is large and diverse. An Eden point base and a Lovell Constricted point fragment, representative of Paleoindian occupation in the area, were recovered from the site. In the main excavation area, several corner-notched points and numerous Rose Spring points were recovered.

In addition to the projectile points, a variety of bifaces were recovered from the Austin Wash Site. These included large, thin knives, some with hafting elements, blanks, preforms and drill fragments. The ten large, whole and fragmentary hafted knives represent an unusual artifact class in the assemblage. These knives include a variety of forms such as side notched, corner notched, basal notch, corner tanged and stemmed. The shape of several of these is unique while others are similar to specimens previously reported. Several large, corner-notched hafted knives were recovered at the Cow Hollow Creek site (Mackey et al. 1983) from reportedly, but undated, Late Archaic levels. One specimen of a large, corner-notched knife that is very similar to one from this site was found at the Vail Pass camp (Gooding 1981:38, Fig. 18c).

More than 100 scrapers were recovered during the excavation, most associated with the bone midden. These scrapers were made predominantly on bladelike flakes worked on the end, side or the end and the side. Most of

these scrapers were manufactured from algalitic chert which is immediately available in the site area. The Spring Creek cave (Frison 1965) in the Shoshoni Basin and the Vail Pass camp near Vail, Colorado (Gooding 1981), have produced scrapers with similar morphology and technology.

A variety of other flake tools were included in the assemblage such as gravers, notched and serrated flakes, wedges, gouges and choppers. Two unusual items were recovered in the bone midden area. One was a small, thin disc bead of black limestone and the other, a battered quartz crystal.

The debitage analysis indicated that most of the expedient tools, such as scrapers and modified flakes, were algalitic chert and were probably manufactured on site. The fact that these tools were manufactured during the processing of the faunal remains explains the presence of a full range of reduction stages for lithic manufacture. Some of the more formal tools, such as projectile points and hafted knives, are made from exotic materials and appear to be manufactured elsewhere and brought to the site.

The plant macrofossil evidence indicates that the Late Prehistoric occupants of the site were using *Chenopodium* and were probably eating strawberries during the processing of the antelope bone. The limited plant remains and lack of ground stone suggests that very little plant processing was taking place during the Late Prehistoric occupation at the site.

In summary, the presence of the highly fragmented faunal remains, roasting pits, postholes, expedient tools and the abundance of scrapers, all indicated that the Austin Wash Site was an antelope processing site. The faunal remains and the charred plant remains indicate the site was probably occupied during the fall. The fact that the full range of antelope bone elements was recovered in the main area indicates that the animals were either killed or trapped very near the processing area and that the whole animal was processed. Several postholes found at the northern end of the excavation area may represent the remnants of an antelope pound where the antelope may have been herded or remnants of racks used for drying antelope meat.

The fragmented nature of the bone collection suggests that the antelope were completely processed, marrow was being extracted from the larger bones and the bones were then being crushed and processed for bone grease. The abundance of scrapers, as well as several bone fleshers, indicates that hide processing was also taking place at the site. This intensive effort may be considered indicative of prewinter processing.

CHAPTER 5

48UT199

Introduction

48UT199 is one of many scattered prehistoric occupation loci on the bench east of the Blacks Fork River near Church Butte in southwestern Wyoming (Fig. 35). The Frontier Pipeline route crosses this site near the Emigrant Trail and old U.S. Highway 30. Three occupational loci of this site (Occupation Areas A, B and C) in the pipeline right-of-way were excavated as part of this data recovery program. These occupation areas represent two Middle Archaic and one Late Prehistoric component. Over 7500 artifacts and 14 features were recorded during this data recovery program.

Previous Investigations

These benches with occupational loci near Church Butte were originally recorded by E. B. Renaud in the 1930s as site W355 (Renaud 1940:27). In 1964 the University of Utah conducted a survey in southwestern Wyoming and assigned the area a Smithsonian trinomial designation, 48UT11 (Sharrock 1966:129). Sharrock (1966:130) recorded the site as a series of "small camping areas and workshops" with abundant lithic material and hearths on both the upper and lower river terraces. Although no detailed site maps were made, Sharrock estimated that the site was 1/4 mile by 3/4 mile in size.

In 1979 one of the occupational loci of the site was located by Western Wyoming College during the survey of a portion of the Trailblazer Pipeline. Unaware that the site complex had already been designated as 48UT11, Western Wyoming College assigned the site number 48UT199 to the occupational locus which measured 100 by 130 m and consisted of a lithic scatter with tools and an associated scatter of thermally altered rock. The site boundary of this locus extends north almost to old U.S. Highway 30 (Miller 1982).

In 1980 several other occupational loci in the area north of old U.S. Highway 30 were recorded as site 48UT397. These loci were identified as a large lithic scatter with no discernible features. A survey and testing program for the pipeline in this area in early 1981 produced six cultural features (Hakiel 1981).



Fig. 35. Excavation of 48UT199, Church Butte in background, Uinta County, Wyoming.

Later that year, additional mapping and testing of the area designated as 48UT397 were conducted by Hakiel (1982). He notes "33 hearth/firepits were recorded in a clear pattern of camp locations utilizing the shelter of the surrounding dunes". Hakiel designated old U.S. Highway 30 as the southern boundary of the occupational loci in the area with the scarp bounding the west side and the edge of sandy deposits representing the eastern boundary. No northern site boundary was recorded by Hakiel although Bureau of Land Management topographic maps with plotted site locations indicate that prehistoric occupation loci continue north along the bluff overlooking the Blacks Fork River for several kilometers.

Prior to the 1983 excavations, only one locus of this large complex of prehistoric occupations had been partially excavated. In 1980 during a cultural resource inventory for the MAPCO pipeline, the occupational locus designated 48UT199 was relocated, mapped, and hand and mechanically tested (Tucker 1982). A backhoe trench was excavated at this locus and established the presence of intact buried cultural materials. Eighteen m² of hand excavation in this area uncovered several cultural features, including firepits and thermally altered rock, bone, ash and lithic concentrations. This occupation was assigned to the Late Prehistoric period on the basis of three radiocarbon dates (1320 \pm 60 years:A.D. 630 [Beta 2246], 1410 \pm 80 years: A.D. 540 [Beta 2247] and 1490 \pm 60 years:A.D. 460 [Beta 2248], Tucker 1982:336) and a Rose Spring point recovered from the buried occupation.

Additional surface collection and testing of the locus occurred in 1981. These excavations added artifactual material to the assemblage but did not change the interpretation that the locus was a Late Prehistoric campsite. Tucker (1982) mistakenly reports that the radiocarbon dates are not contemporaneous, leading the researchers to believe that this locus represented at least three distinct occupations. However, a test of contemporaneity (Long and Rippeteau 1974) demonstrates that the dates are statistically contemporaneous, and thus, the artifact assemblage from these excavations must be considered as a single Late Prehistoric occupation of the locus.

The Frontier Pipeline right-of-way crosses old U.S. Highway 30, the arbitrary boundary between 48UT199 and 48UT397, only about 100 m from the edge of the scarp. Thus, the pipeline right-of-way crosses the edge of the 48UT199 locus as well as a portion of 48UT397. Since site numbers are arbitrary designations, particularly along the benchlands near Church Butte where so many different prehistoric occupational loci overlap, this report identifies all of the excavations as occurring within the boundaries of 48UT199.

Field Methods

The distribution of cultural materials in the pipeline right-of-way at this site demonstrated that several distinct occupation areas would be encountered. The grid system was placed so that all areas with cultural material in the right-of-way would be included. Initial tests and the

magnetic survey eventually identified three distinct areas of prehistoric occupation. Two of the areas were on the north side of the old highway. These two areas, Occupation Areas A and B, were separated by about 12 m. The third area, Occupation Area C, was on the south side of the old highway (Fig. 36).

Midway through the excavation, a backhoe was used to dig a trench between Occupation Areas A and B to determine if there was any stratigraphic continuity between the two prehistoric loci. About 80 m of backhoe trenches were also dug on the south side of the road near Occupation Area C. These backhoe trenches did not expose any buried cultural levels, but did expose two isolated cultural features to the north of the main excavation area, C, on this side of the road. It should be noted that the 1983 excavated areas were more than 200 m to the west of the excavations conducted in 1980 and 1981 at a Late Prehistoric locus on the MAPCO pipeline.

Site Setting

This site is located on a terrace 2.4 km east of the Blacks Fork River. This bench provides a commanding view of the lower river terrace and floodplain to the west. Directly to the west, Church Butte and an eroded badlands scarp is only 1 km away. To the northwest, the Salt River Range is visible as are the Uinta Mountains to the southwest and the Wind River Mountains to the northeast.

The area of cultural deposits along the bench conforms closely to the distribution of sheet sand that blankets the edge of the terrace. These sand sheets result from depositions of wind-borne sand whipping up the face of the scarp and extend less than 800 m from the edge of the scarp. Underlying the sand is a weathering sandstone or mudstone.

The vegetation of the area varies dramatically with presence or absence of lowlying sand dunes. The sandy areas are dominated by desert shrub community plants including large sagebrush, rabbitbrush, greasewood, shadscale and hopsage. Of the grasses and small forbs, Indian rice grass is the most common. In the sparsely vegetated desert pavement areas, low Gardner saltbush and small forbs are common.

Stratigraphy

Sandy deposits cover much of the site area, but isolated patches of desert pavement are present throughout the area. The moderately well sorted sand is not completely eolian but contains some colluvial deposition with pebble to cobble size clasts throughout the deposits (Oviatt 1983).

The excavation block on the south side of the old highway, Occupation Area C, was located in an area of deep sandy deposits resembling a truncated dune. Grain size analysis showed only minor variations in grain size

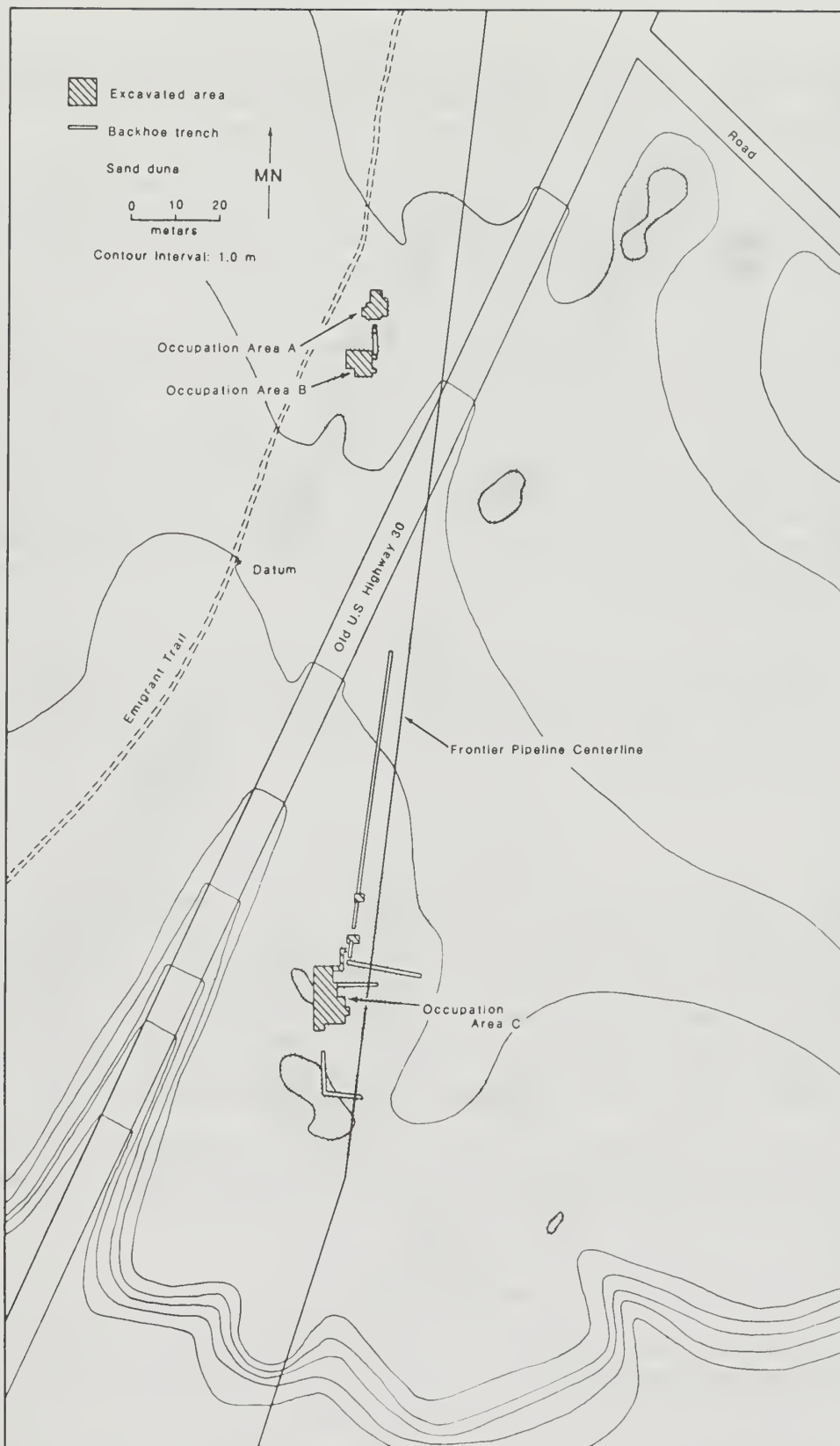


Fig. 36. Plan map of site area, 48UT199, Uinta County, Wyoming.

and compactness. Calcium carbonate is mixed with the sand and is present throughout, increasing with the depth in the deposits. There are well cemented sands at the interface between the bedrock and the sand.

There was a 6 to 20 cm band of calcium carbonate found 10 to 30 cm below present ground surface in this area. The stratigraphic position of the calcium carbonate layer (a leaching zone) relative to the ground surface suggests that the present ground surface is relatively stable.

In the linear sand dune deposits excavated north of old U.S. Highway 30, Areas A and B, a somewhat different depositional regime is suggested. Unlike deposits south of the old highway, no calcium carbonate layer was identified under the present ground surface. Although vegetation was present over most of the deposits, the Emigrant Trail immediately north of the excavations and the old highway right-of-way immediately south of the excavations have probably disrupted natural soil development for over 100 years. Alternatively this lack of pedogenic development may be a result of strong winds coming up the scarp. A constant condition of deposition and deflation may have effectively retarded development of a calcium carbonate horizon in these deposits.

On both sides of the roads, excavations reached a maximum depth of 1.5 m. No discernible cultural stratigraphy was evident in the excavations and units were excavated in 10 cm arbitrary levels. Three distinct use or occupation areas, identified by staining, features and concentrations of artifacts, were identified.

Cultural Features

Three main areas were excavated at this site. Analysis of the data from each of these areas indicates that each area, Occupation Areas A, B and C, represents a chronologically distinct occupation. Excavation in these three areas produced a total of 12 cultural features, three in Occupation Area A, nine in Area B and none in Area C (Fig. 37). Several additional features were identified during blading of the right-of-way through the excavated areas of the site. Unfortunately, these features were heavily damaged and little information could be obtained from them.

The cultural features excavated at these occupational loci include firepits, a rock-filled firepit, a roasting pit, ash dumps, an ash pit, trash pits and postholes.

Backhoe Trench

Two firepits were discovered in the backhoe trench several meters north of the Occupation Area C.

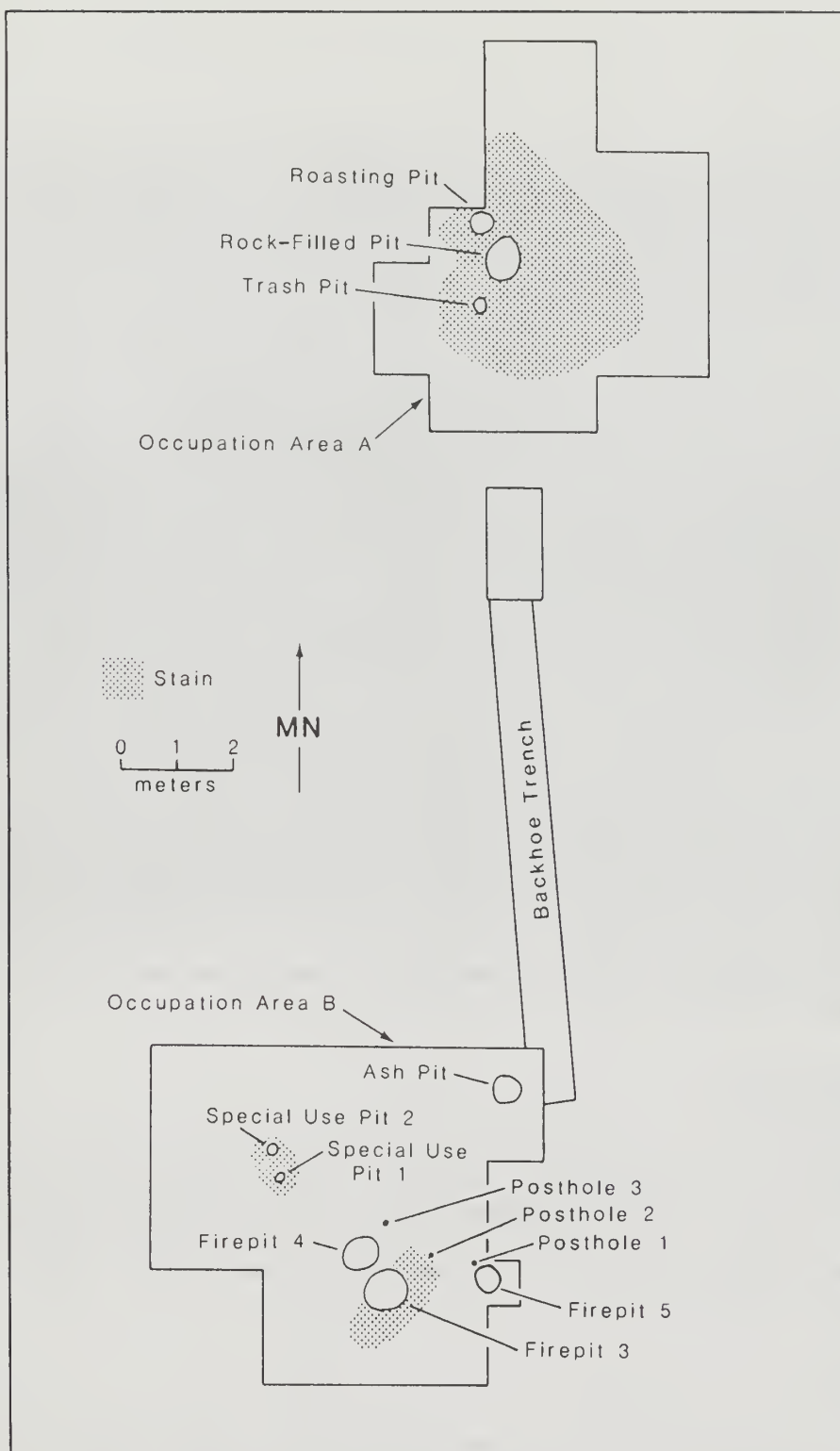


Fig. 37. Plan map of excavated area and features in Occupation Areas A and B, 48UT199, Uinta County, Wyoming.

Firepits

Firepit 1

Firepit 1 measured 102 by 91 cm and was 27 cm deep. This firepit, located just under the present ground surface, contained large amounts of charcoal, small amounts of thermally altered rock fragments and a few flakes. Radiocarbon analysis of charcoal recovered from this feature yielded a date of 1260 ± 70 years:A.D. 690 (Beta 7269).

Firepit 2

Firepit 2 was located 6 m further north of Firepit 1 in the backhoe trench and was also found just under the ground surface. This circular basin measured 62 by 59 cm and was 24 cm deep. Moderate amounts of charcoal were recovered from the fill, but no artifacts. The similarity between Firepits 1 and 2 and their relative stratigraphic position and proximity to each other suggest that they both represent an activity area of a Late Prehistoric occupation in the immediate area, perhaps they are even associated with the heavy Late Prehistoric activity area excavated in Occupation Area A.

Occupation Area A

The prehistoric occupation at this locus is assigned to the Late Prehistoric period on the basis of one radiocarbon date and several associated Late Prehistoric artifacts. A dense scatter of thermally altered rock and a dark stain outlined the main activity area in this block excavation. The cultural material was recovered in a 20 to 30 cm thick zone about 40 cm below present ground surface. Only three associated features, a "tri-hearth complex", were identified in this area.

Tri-hearth Complex

A roasting pit, an adjacent rock-filled pit and an associated trash pit comprise this "tri-hearth complex" (Brown 1978c) (Fig. 38). The roasting pit is the central feature within this complex and is flanked by the other two pits. This feature complex was just under a large amorphous stain and heavy concentration of thermally altered rock, charred bone, debitage and tools.

Roasting Pit

The roasting pit was oval with straight walls and a rounded bottom and measured approximately 80 by 70 cm and was 50 cm deep. The pit fill contained a moderate amount of thermally altered quartzite cobbles, charcoal,



Fig. 38. Tri-hearth complex, Occupation Area A, 48UT199, Uinta County, Wyoming.

charred bone and debitage. The interior of this feature had been heavily disturbed by rodent activity which inhibited initial identification of the upper pit boundary.

Rock-filled Firepit

The rock-filled pit measured 48 by 40 cm and was 21 cm deep. The pit was nearly full of burned quartzite cobbles and cobble fragments. Charcoal, charred bone and debitage were also present throughout the pit. Charcoal from this feature yielded a date of 1460 \pm 90 years:A.D. 490 (Beta 7277).

Trash Pit

The trash pit associated with the "tri-hearth complex" is approximately 40 cm southwest of the roasting pit. This relatively small pit measured 29 by 24 cm, 18 cm deep and is oval in plan view with slightly inward curving walls forming a rounded bottom. Charcoal, debitage, charred bone and thermally altered quartzite cobbles were mixed throughout the pit fill.

Occupation Area B

The prehistoric occupation in this area is assigned to the Middle Archaic period. Occupation Area B had the most features of the three block excavated areas. In addition to Firepits 1 and 2 recorded in the backhoe trench near Occupation Area C, three additional firepits, Firepits 3-5, were exposed and recorded in this area. Firepit 4 produced a radiocarbon date of about 2900 B.C. Additionally, one Ash Pit, two Special Use Pits and three postholes were recorded in this area.

The firepits and Special Use Pits were found under large, dark amorphous stains. Just above these stains were a scatter of debitage, tools and thermally altered rock. The cultural material was concentrated in a 20 cm thick layer about 60 to 80 cm below the ground surface.

Firepits

Firepit 3

This firepit is a circular basin measuring 70 cm in diameter and 22 cm deep. Firepit 3 contained dark-stained soil, charcoal and ash with some charred bone, thermally altered rock and debitage. Very pale, yellowish orange oxidation was present along the pit walls but was absent near the bottom of the pit.

Firepit 4

Firepit 4 is almost identical to Firepit 3 which is only 20 cm to the northwest. This feature is 70 cm in diameter and 25 cm deep. Oxidation along the pit walls was similar to that occurring in Firepit 3. The fill of this firepit contained much charcoal and a single modified cobble. Charcoal recovered from Firepit 4 produced a date of 4890 ± 240 years:2940 B.C. (Beta 7276).

Firepit 5

Firepit 5 is approximately 1 m south of Firepit 3 and was located just below the amorphous stain in this excavation area. This firepit measured 61 by 42 cm and was 16 cm deep. Charcoal was the only material present in the feature fill.

Pits

Ash Pit

One oval, basin-shaped ash pit, 58 by 47 cm and 18 cm deep, was discovered in the northeast area of this excavation block. There were no artifacts in the ash-stained fill. A large amount of debitage was recovered around this feature.

Special Use Pits 1 and 2

Special Use Pits 1 and 2 occurred within 30 cm of each other under the amorphous stain in this occupation area (Fig. 39). Both pits have slightly inward sloping walls and rounded bottoms. These features resemble the postholes found about 3 m to the southwest but are slightly larger. Special Use Pit 1 measured 22 by 20 cm and 12 cm deep, and contained only a few pieces of debitage. Special Use Pit 2 is 33 by 21 cm and 9 cm deep and contained a few small pieces of thermally altered rock and some charred bone fragments.

Postholes

Three postholes were recorded under the dark stain in this excavation area. The postholes range from 8 to 16 cm in diameter and from 5 to 13 cm deep. These postholes form a slight arc bending away from Firepits 3, 4 and 5.

Occupation Area C

Although a slight stain was observed and a dense concentration of thermally altered rock was excavated in Occupation Area C, no features were



Fig. 39. Special Use Pits 1 and 2, Occupation Area B, 48UT199, Uinta County, Wyoming.

noted other than Firepits 1 and 2 discovered during backhoe testing (Fig. 40). No radiocarbon dates were obtained from this area, but the cross dating of the recovered projectile points suggest that this occupation area may be assigned to the Middle Archaic period. Cultural material in this area was recovered from 50 to 90 cm below the present surface. The artifacts and thermally altered rock were found in a 25 to 35 cm thick zone in the matrix.

Flaked Stone Artifacts

A total of 206 flaked stone artifacts were recovered during the 1983 excavations at 48UT199 (Table 13). This includes 79 bifaces, 11 scrapers, 11 gravers, 69 modified retouched flakes and 39 cores, core tools or cobbles.

Bifaces

Of the 79 bifaces, 16 are projectile points, one is a hafted knife, 22 are blanks and 40 are preforms.

Projectile Points

McKean Lanceolate

Two McKean lanceolate points were recovered at this site, one from Occupation Area A and the other from Area C (Table 13, Fig. 41a, b). Both have lanceolate blades with indented, notched bases. These two points are of similar length, (33 and 34 mm), width (18 and 19 mm) and thickness (4 and 5 mm). The brown chalcedony specimen constricts more severely towards the base (9 mm) than does the one of quartzite (14 mm).

Hanna

Two Hanna points were recovered at 48UT199; one was found during excavation of Occupation Area B while the other was discovered on the surface next to the road cut bank near Occupation Area B (Table 13, Fig. 41c, d). Both have expanding stems with a basal notch and tanged shoulders.

The one from Area B measures 33 mm in length, 24 mm in width, 6 mm in thickness and has a base 16 mm wide. It was made from a brown oolitic chert. Very little oolitic chert was recovered during this project but sources are common 100 to 160 km east in the Red Desert. The other, a fragmentary point, is made of brown chalcedony and is 19 mm wide, 4 mm thick and has a base 13 mm wide.

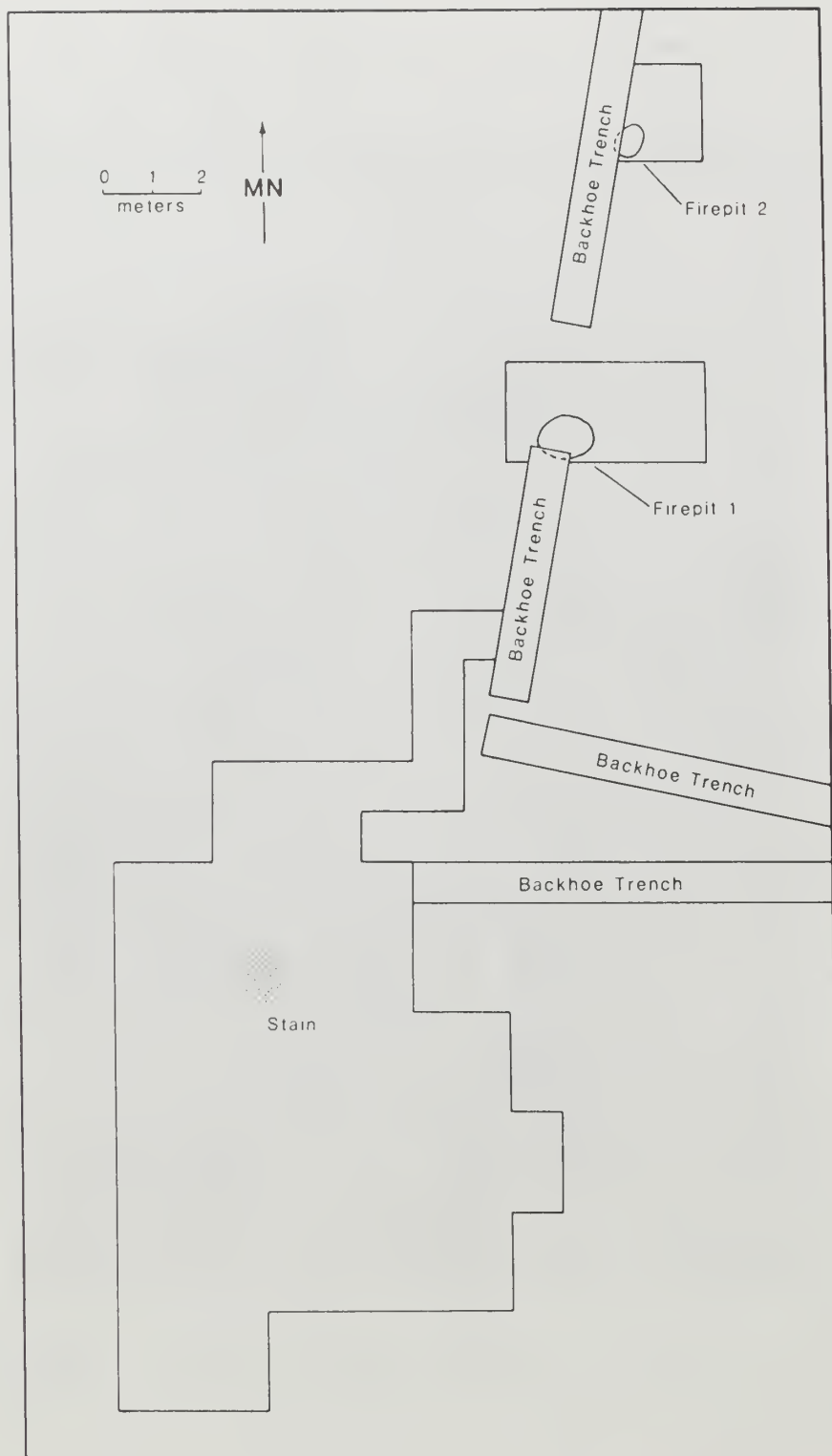


Fig. 40. Plan map of Occupation Area C, 48UT199, Uinta County, Wyoming.

Table 13. Distribution of flaked stone artifact classes by material type and area, 48UT199, Uinta County, Wyoming.

Artifact Class	Quartzite		Chalcedony			Chert							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
Area A													
Projectile points													
McKean lanceolate	0	0	0	1	0	0	0	0	0	0	0	0	1
Elko Corner-notched	0	0	0	0	1	0	0	1	0	0	0	0	2
Other fragments	0	0	0	0	0	0	0	0	0	1	0	0	1
Blanks	0	0	0	0	0	0	0	2	0	0	0	0	2
Preforms	0	0	0	0	0	0	0	7	0	0	0	0	7
Scrapers	0	0	0	0	0	0	0	3	0	0	0	0	3
Gravers	0	0	0	0	0	0	0	2	0	0	0	0	2
Notched flakes	0	1	0	0	0	0	0	0	0	0	0	0	1
Other modified flakes	0	3	1	0	0	0	0	4	0	0	0	0	8
Cores	0	0	0	0	0	0	0	3	0	0	0	0	3
Modified cobbles/pebbles	0	1	0	0	0	0	0	1	0	0	0	0	2
Total-Area A	0	5	1	1	1	0	0	23	0	1	0	0	32

Table 13. Continued.

Artifact Class	<u>Quartzite</u>		<u>Chalcedony</u>			<u>Chert</u>							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
Area B													
Projectile Points													
Hanna	0	0	0	0	0	0	0	0	0	0	0	1	1
Pelican Lake	0	0	0	1	0	0	0	1	0	0	0	0	2
Small stemmed	0	0	0	0	1	0	0	0	0	0	0	0	1
Other fragments	0	0	1	0	0	0	0	2	0	1	0	0	4
Hafted knife	0	0	0	0	0	0	0	1	0	0	0	0	1
Blanks	0	5	1	0	0	0	0	7	0	0	0	0	13
Preforms	0	5	0	0	0	0	0	9	0	1	0	0	15
Scrapers	0	4	0	0	0	0	0	2	0	0	0	0	6
Gravers	0	2	1	0	1	0	0	4	0	0	0	0	8
Notched flakes	0	0	0	0	1	0	0	2	0	0	0	0	3
Other modified flakes	0	5	0	0	2	0	0	18	0	0	0	0	25
Cores	0	1	1	0	1	0	0	9	0	0	0	0	12
Modified cobbles/ pebbles	0	0	0	0	0	0	0	2	0	0	0	0	2
Total-Area B	0	22	4	1	6	0	0	57	0	2	0	1	93

Table 13. Continued.

Artifact Class	Quartzite		Chalcedony			Chert							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
Area C													
Projectile Points													
McKean lanceolate	0	1	0	0	0	0	0	0	0	0	0	0	1
Large stemmed	0	0	0	0	0	0	0	0	0	0	1	0	1
Other fragments	0	0	0	0	0	0	0	1	0	0	0	0	1
Blanks	0	0	0	0	0	0	0	6	0	0	0	0	6
Preforms	2	1	0	0	0	0	0	6	0	0	0	0	9
Scrapers	0	1	0	0	0	0	0	0	0	0	0	0	1
Gravers	0	0	0	0	0	0	0	1	0	0	0	0	1
Notched flakes	0	0	0	0	0	0	0	1	0	0	0	0	1
Serrated flakes	0	0	0	0	0	0	0	2	0	0	0	0	2
Other modified flakes	3	5	3	0	2	2	1	12	0	0	0	0	28
Cores	0	1	3	0	0	2	0	8	0	0	0	0	14
Modified cobbles/pebbles	1	0	0	0	0	0	0	3	0	0	0	0	4
Total-Area C	6	9	6	0	2	4	1	40	0	0	1	0	69

Table 13. Continued.

Artifact Class	<u>Quartzite</u>		<u>Chalcedony</u>			<u>Chert</u>							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
Other Excavation Areas													
Projectile Points													
Hanna	0	0	0	0	1	0	0	0	0	0	0	0	1
Blanks	0	0	0	0	0	0	0	2	0	0	0	0	2
Preforms	0	1	0	1	1	0	0	2	0	0	0	0	5
Scrapers	0	1	0	0	0	0	0	0	0	0	0	0	1
Retouched Flakes	0	1	0	0	0	0	0	0	0	0	0	0	1
Cores	0	0	0	0	0	0	0	2	0	0	0	0	2
Total-Other Exca- vated Areas	0	3	0	1	2	0	0	6	0	0	0	0	12
Site total	6	39	11	3	11	4	1	126	0	3	1	1	206

Pelican Lake

Two Pelican Lake points were recovered from Occupation Area B (Table 13; Fig. 4le, f). Both have expanding stems and tanged shoulders which are broken. One point is of gray/white chalcedony and is 29 mm long, 19 mm wide and 5 mm thick with a base 12 mm wide. The other is of algalitic chert and measures 36 mm in length, 24 mm in width, 5 mm in thickness and has a basal width of 15 mm.



Fig. 41. Projectile points and hafted knife, 48UT199, Uinta County, Wyoming. a, b, McKean Lanceolate; c, d, Hanna; e, f, Pelican Lake; g, h, Elko; i, large stemmed; j, small stemmed; k, hafted knife

Elko Corner-notched

Two fragmentary corner-notched points that appear to be Elko points were recovered from Occupation Area A (Table 13, Fig. 4lg, h). They are too fragmentary to compute measurements but both are over 24 mm wide and 4 mm thick. One specimen is made of brown chalcedony and the other is made of algalitic chert.

Large stemmed

One large stemmed point was recovered from Occupation Area C (Table 13; Fig. 4li). This nearly complete specimen does not resemble any named projectile point type from either the Great Basin or Great Plains. One small portion of the stem and the very distal portion of the point are missing. The stem is slightly expanding. Notches at the juncture of the stem and blade produce well defined shoulders. Material is a mottled/speckled chert. Cortex on both sides of the blade indicates it was made from a rather thin pebble.

Small stemmed

A small stemmed point was found during excavation in Occupation Area B (Table 13; Fig. 4lj). On the base just below the neck, a snap fracture is present at 90° to the long axis. It also appears that the point may have had barbed or square shoulders. These are now missing, leaving an obtuse shouldered appearance. This arrow point, which may have been discarded prior to its use, resembles no known type from the Great Basin or Great Plains.

Other Fragments

Six projectile point fragments also were recovered during the 1983 excavations (Table 13). One chert fragment is from Occupation Area A, one of moss agate, two of algalitic chert and another of chert were recovered at Area B and an algalitic chert fragment was found in Area C. All the fragments in this category exhibit some trace of notching and a portion of the base. Tips and small fragments lacking notches are included in the preform category.

Hafted Knife

One stemmed, obtuse shouldered knife with a slightly asymmetrical stem was recovered in Occupation Area B (Table 13; Fig. 4lk). One edge of the stem is slightly longer than the other creating a slight angle between the blade and stem. Both blade edges are excurvate. The blade edges are slightly serrated. The knife is made from algalitic chert. There is a striking similarity in the morphology of this knife and a much larger but morphologically similar knife from the Austin Wash Site.

Blanks

Bifacially flaked artifacts that are thick, contain significant amounts of cortex, and are generally irregular in outline have been classified as blanks. Although the term blank refers to an initial step in the bifacial reduction sequence, some of these may have been the final intended form desired by the manufacturer. Twenty-three blanks were recovered from the excavations, including two from Occupation Area A, 13 from Area B and six from Area C. One blank has an unknown provenience and another is from the other excavation areas.

The size of these specimens varied significantly. Based upon whole measurements, they ranged from 29 to 90 mm long, 19 to 58 mm wide and 8 to 28 mm thick. Sixteen specimens are made from algalitic chert, five from quartzite and one from moss agate. Some of these blanks may have been used for chopping/cutting functions while others were abandoned during tool manufacture.

Preforms

Bifacially flaked specimens that are less robust, possess less cortex and have a more regular outline than blanks that are classified as preforms (Fig. 42). Many preforms exhibit fine retouch along the blade margins and many small fragments and tips may actually be portions of projectile points. A total of 40 preforms were recovered during the 1983 excavations; eight are from Occupation Area A, 18 are from Area B, nine are from Area C, one is from the area around Firepit 2 and the remaining four are from other excavation areas (Table 13).

Based upon available complete measurements, length varies between 30 and 75 mm with a mean of 53 mm, width varies between 14 and 56 mm with a mean of 29 mm and thickness between 3 and 12 mm with a mean of 6 mm. Distribution of material types within is similar to that of the blanks with 26 of algalitic chert, ten of various quartzite, three of chalcedony and one of chert.

Unifaces

A total of 11 unifacially flaked artifacts recovered at 48UT199 are classified as scrapers, including three from Occupation Area A, six from Area B, one from Area C and one from the other excavated areas.

Scrapers

The 11 scrapers do not exhibit the consistency of size and blade-flake characteristics prevalent in the collection from the Austin Wash Site (Fig. 43). One specimen from Area A is what is commonly referred to as a thumbnail scraper (Fig. 43a), the others are much larger. Lengths of the whole specimens vary from 33 to 117 mm with a mean of 64 mm, width varies

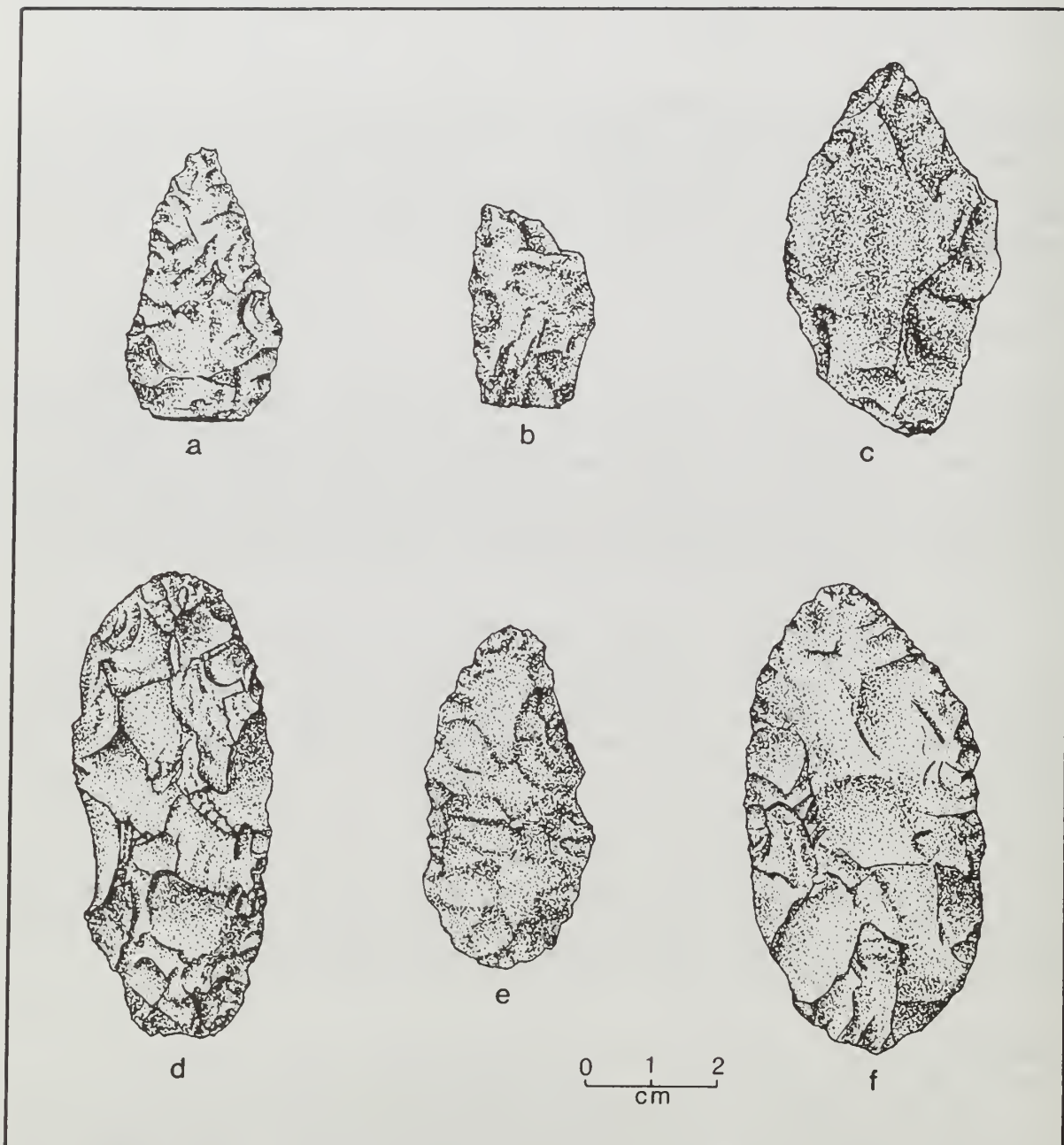


Fig. 42. Selected preforms, 48UT199, Uinta County, Wyoming.



Fig. 43. Selected scrapers, 48UT199, Uinta County, Wyoming.

from 20 to 112 mm with a mean of 52 mm and thickness from 6 to 41 mm with a mean of 16 mm. Like the scrapers from the Austin Wash assemblage, these are fairly well divided between side scrapers (four), end scrapers (three) and side/end scrapers (four). Unlike the scrapers from Austin Wash, the scrapers are of algalitic chert in less than half the cases (five) with the remaining six of quartzite. Scraping functions are inferred from these specimens although several, particularly the side scrapers, could have also served as cutting tools.

Gravers

Eleven specimens classified as gravers were recovered from 48UT199 (Table 13). Two gravers were recovered in Area A, eight in Area B and one in Area C. Seven gravers are made from algalitic chert, two of gray quartzite and one each of moss agate and brown chalcedony. Functions associated with these tools are cutting and scoring or engraving.

Modified Flakes

Notched flakes

Five flakes exhibiting one or more intentionally retouched concavity are classified as notched flakes. One specimen was recovered in Area A, three in Area B and one in Area C. Of the five specimens recovered, two had two notches and the remaining three had one each. The size of flake varied only slightly with length ranging from 26 to 44 mm with a mean of 39 mm, width from 23 to 37 mm with a mean of 30 mm and thickness from 9 to 14 mm with a mean of 12 mm. The notches varied from 4 to 13 mm wide with a mean of 8 mm. Three of these notched flakes are of algalitic chert and one each are of brown chalcedony and quartzite. These tools are sometimes referred to as spokeshaves and a planing function is inferred for them.

Serrated Flakes

Two flakes exhibiting an intentionally produced jagged or toothed edge are classified as serrated flakes. Both were recovered from Occupation Area C and are of algalitic chert. They are 69 and 45 mm in length, 28 and 26 mm wide and 7 and 8 mm thick, respectively. The toothed or serrated appearance suggests a sawing or heavy cutting function.

Other Modified Flakes

Sixty-two flakes and flake fragments which exhibited at least one contiguous centimeter of retouch or edge rounding were classified as retouched flakes. It is uncertain whether retouch resulted from intentional manufacture or as a result of use on a particular material. Modified flakes were located in all three occupation areas with eight at

Area A, 25 in Area B, 28 in Area C and one from the excavations around Firepit 2 just north of Area C.

These items ranged in length from 22 to 78 mm, width from 15 to 63 mm and thickness from 2 to 23 mm. Means for the measurements are 40 mm, 37 mm and 9 mm, respectively. Variability of material types is also present in the collection with 34 of algalitic chert, 19 of quartzite, four of moss agate, and the remaining of various cherts and chalcedonies. Functions inferred for these tools include cutting and scraping.

Cores, Core Tools and Cobbles

Cores

Artifacts exhibiting three or more apparently intentional flake removals are classified as cores. The 31 cores were further grouped by the type of flake removal, i.e., random, unidirectional and bifacial. Three unidirectional, three bifacial and 25 random cores and core fragments were recovered. Three cores were associated with Area A, 12 with Area B, 14 with Area C and two from the site surface (Table 13).

These cores ranged in length from 45 to 199 mm with a mean of 71 mm, width from 28 to 92 mm with a mean of 47 mm and thickness from 13 to 69 mm with a mean of 27 mm. Not surprisingly, the most common material is the locally ubiquitous algalitic chert with 22 specimens. Other materials include chert, chalcedony, moss agate and quartzite.

Modified Cobbles and Pebbles

Cobbles and pebbles that exhibit minimal modification, including those that are split to form a usable edge, those that are pecked or those that have less than three flake removals, are classified as modified cobbles and pebbles. Two of the cobbles are from Area A, one pebble and one cobble are from Area B, and two cobbles and two pebbles are from Area C.

The sample from 48UT199 includes five cobbles and three pebbles. One is a longitudinally sectioned quartzite cobble with edge rounding along the noncortical edge. Two cobbles have two flake scars, possibly for examining the quality of material. One flat, tabular piece of weathered chert possesses minimal retouch along one edge forming a chopperlike tool and another has a bifacially retouched edge and one side that has been pecked. Of the pebbles, one has been slightly unifacially retouched, another is bifacially retouched and the other appears to have only been tested for the flakeability of the material.

All of the pebbles and cobbles, with the exception of the longitudinally split cobble, retain 80% or more cortex or weathered surface and appear to be from the desert pavement. Four of the five cobbles are

algalitic chert and the other being gray quartzite. Two of the three pebbles are also algalitic chert with the other of purple quartzite.

Debitage

Table 14 presents thedebitage sorted by material type and reduction stage. The predominant material is again algalitic chert (50.1%). However, in contrast to the Austin Wash Site, there is a strong quartzite representation (34.1%). Tracing this observation to distributions of the individual areas, we find quartzite makes up about 22% of thedebitage from Areas A and C and 44% of the Area B collection. The distribution is similar to that of the raw materials of the formal tool categories for Areas A and C (Table 13). However, the formal tool categories do not reflect the greater occurrence of quartzite from Area B.

For reduction categories, the combined relative frequency of secondary and final thinning flakes is only slightly greater than that of initial reduction and primary thinning flakes (Table 14). Decortication flakes make up the smallest portion of thedebitage. Among the areas, Area A shows a predictable increase in frequency in each reduction category with a slight decrease in final shaping flakes (Table 15). Area B shows a similar progression with higher relative frequencies in the first three categories. Area C has relatively more decortication, initial reduction and primary thinning flakes. Thus, the entire reduction sequence is represented in each area; however, the emphasis is more clearly on the early stages in Area C.

The differences among the areas, then, include raw material and reduction emphasis. Examination of the formal tool types from each area provides some suggestions for explanations of these contrasts. Each area yielded projectile points, blanks and preforms, flake tools and cores. Over 30% of the blanks and preforms from Area B were manufactured from quartzite. Other quartzite tools included scrapers, graters, modified flakes and a core. In contrast, Area A has only modified quartzite flakes and a cobble and Area B has several preforms, a scraper, modified flakes and a cobble. The greater diversity of quartzite tools from Area B coupled with information from thedebitage suggests a greater emphasis on use of this material. Because the availability of both quartzite and cryptocrystalline materials is similar and there is no clear functional reason for its selection, a cultural preference for quartzite may be postulated for the earliest occupational locus at 48UT199.

The kinds of formal tools along with thedebitage also suggests slightly different behavior in Area C. Area C has more cores and modified flakes relative to the area assemblage than either of the other collections. These elements combine neatly with the lack of structured features to suggest greater emphasis on primary lithic reduction as an activity in this area with frequent, casual use of waste flakes rather than manufacture of sophisticated finished products.

Table 14. Frequency of debitage by reduction stage and material type,
48UT199, Uinta County, Wyoming.

Reduction Stage	Quartzite			Chalcedony			Chert					Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algaitic	Solid Brown	Solid Other	Mottled/Speckled	
Decortication	2	96	34	5	7	8	0	156	0	2	6	316
Initial reduction	0	305	75	10	8	27	1	603	0	6	22	1057
Primary thinning	2	421	31	5	15	23	0	431	2	1	22	954
Secondary thinning	0	388	61	20	84	46	0	513	8	23	19	1166
Final shaping	1	218	46	21	59	52	0	480	2	23	18	922
Indeterminate	0	723	74	33	46	62	1	948	1	24	32	1948
Other	0	7	0	0	0	0	0	7	0	0	0	14
Total flakes	5	2158	321	94	219	218	2	3138	13	79	119	6377
Shatter/chunks	0	325	21	15	7	15	0	512	2	3	9	909
Total Debitage	5	2483	342	109	226	233	2	3650	15	82	128	7286

Table 15. Reduction stages by occupation areas,
48UT199, Uinta County, Wyoming.

Reduction Stage	Area A	Area B	Area C	Other Excavations	Total
Decortication	50	152	94	20	316
Initial reduction	144	540	310	63	1057
Primary thinning	177	572	180	25	954
Secondary thinning	382	638	125	21	1166
Final shaping	281	475	128	38	922
Indeterminate	69	1047	364	68	1548
Other	1	9	4	0	14
Total flakes	1104	3433	1205	235	5977
Shatter/Chunks	213	520	155	21	909
Total debitage	1317	3953	1360	256	6886

Faunal Analysis

A total of 827 bone specimens were recovered during the excavation of 48UT199. None exhibited purposeful modification, although butchering marks were noted on some of the specimens. Table 16 presents the distribution of identifiable specimens and the minimum number of individuals by occupation area. As with the faunal remains from the other sites excavated during this project, the bulk of the remains appear to be from large mammals, most likely pronghorn antelope.

Occupation Area A produced about 82% of the total collection. The majority of the fragments in this area are from at least two antelope. The remaining specimens are distributed between five other identifiable genera, jackrabbit, cottontail, prairie dog, ground squirrel and pocket gopher. One hundred and twenty-five fragments were burned from this area. Of these burned specimens, 124 were antelope or large mammal fragments including three mandible, one tibia and one phalanx specimens, and 119 other fragments. The remaining burned element was a femur from a jackrabbit. The specimens were highly weathered from this occupation area with a modal weathering stage of 4.

The average length of the bone fragments in this area was less than 3 cm indicating that the collection had been broken for bone marrow and possible bone grease production. Butchering marks were present only on the antelope/large mammal bones. One femur fragment had about a dozen transverse cut marks, possibly for the removal of the periosteum. One humerus and two phalanges also had cut marks as well as four long bone and rib

Table 16. Faunal remains from 48UT199, Uinta County, Wyoming.

Taxa	Occupation Area A		Occupation Area B		Occupation Area C		Other Excavations	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Bison (<u>Bison bison</u>)	--	--	1	1	--	--	--	--
Antelope (<u>Antilocapra americana</u>)	67	2	9	1	6	1	1	1
Large mammal	555	--	75	--	24	--	4	--
Jackrabbit (<u>Lepus townsendii</u>)	3	1	--	--	--	--	--	--
Medium mammal	19	--	--	--	--	--	--	--
Cottontail (<u>Sylvilagus</u> sp.)	1	1	8	1	--	--	--	--
Prairie dog (<u>Cynomys eucurus</u>)	1	1	3	1	--	--	--	--
Ground squirrel (<u>Spermophilus</u> sp.)	15	3	3	1	--	--	--	--
Pocket gopher (<u>Thomomys talpoides</u>)	6	4	3	2	--	--	--	--
Woodrat (<u>Neotoma cinerea</u>)	--	--	1	1	--	--	--	--
Vole (<u>Microtus</u> sp.)	--	--	--	--	1	1	--	--
Small mammal	1	--	5	--	--	--	--	--
Unidentifiable	14	--	1	--	--	--	--	--
Total	682	12	109	8	31	2	5	1

NOTE: NISP = Number of Identified Specimens per Taxon; MNI = Minimum Number of Individuals.

fragments. The lack of relatively complete mandibles from antelope hampers the identification of the season of occupation in this area.

Occupation Area B produced only 109 bone specimens. This area did produce the distal end of the left radius of a bison, in addition to specimens from antelope, cottontail, prairie dog, ground squirrel, pocket gopher and woodrat. The single bison radius, coupled with a lack of other large bone fragments in this area, indicates that only a small portion of the bison was brought to this area of the site and the killing and butchering took place somewhere else. About 34% (29) of the antelope and large mammal bones were burned. None of the smaller mammal bones were burned and none of the specimens from this occupation area showed evidence of butchering. The bone from this occupation area, with a median weathering stage of 2, were the least weathered of the collection from this site.

Occupation Area C only produced 31 bone fragments, seven identifiable to genus. Six of the specimens, including fragments of a femur, tibia, cubo-navicular and mandible, were identified as antelope. The right mandible of a vole was also identified from this area. The remaining 24 fragments were from a large mammal, probably antelope. Only six of the large mammal fragments were burned, and again none of the bones evidenced cut marks. The bones in this area were slightly less weathered than those from Area A but more weathered than Area B with a modal category of 3. An additional five bone fragments were recovered from other excavations at the site (Table 16).

Plant Macrofossil Analysis

A total of 15 samples were examined and processed for charred plant macrofossils. These samples included the fill from all features except one posthole, and a bulk sample from Occupation Area B and another from Occupation Area C. Only two charred goosefoot (Chenopodium sp.) seeds were recovered; one was from Firepit 1 and the other was from the Roasting Pit.

Summary and Conclusions

48UT199 consists of a large number of prehistoric occupational loci on a bench overlooking the Blacks Fork River. The 1983 excavations resulted in the identification of three loci of activity designated Occupation Areas A, B and C. In 1981 and 1982, other excavations were conducted at an occupational locus approximately 200 to 300 m east of those summarized here (Miller 1982; Tucker 1982).

Occupation Area A was identified by artifacts, debitage, thermally altered rock, and charred and uncharred bone within a dark gray/black stain. Beneath the stain was a "tri-hearth" feature complex consisting of a small trash pit, a deep roasting pit and a rock-filled firepit. Artifacts associated with Occupation Area A include bifaces, modified cobbles, scrapers, utilized flakes, graters and a notched flake. Although a Middle

Archaic McKean projectile point was recovered in this area, charcoal in the rock-filled pit was radiocarbon dated 1460 ± 90 years:A.D. 490 (Beta 7277). This date does support the speculation by Brown (1979) that "tri-hearths" are common during the Late Archaic-Late Prehistoric transition.

The bulk of the bone encountered in this area was extremely fragmented, and probably represent the remains of two antelope. Such fragmentation is associated with bone grease processing indicating maximum utilization of the kill. The lack of ground stone and the recovery of only one charred chenopodium seed from the Roasting Pit suggests that seed processing was not a major activity at this occupation locus.

Occupation Area B, 12 m south of Area A, is represented by an artifact scatter consisting of bifaces, projectile point fragments, scrapers, utilized flakes, gravers, notched flakes and cores, as well as ten cultural features. These features include firepits, postholes, special use pits and an ash pit. Both features and artifacts were more numerous in this area than in Area A. These features occurred in a single level and most likely are associated with a single occupation. The postholes may represent a habitation structure. In any event, the abundance of features, tools and debitage suggest a longer occupation here than Area A. One of the firepits was radiocarbon dated to 2890 B.C.

None of the projectile point fragments found at the level of the feature complex were diagnostic. A Rose Spring and a Hanna point were recovered in what appears to be culturally mixed levels above the feature complex. But the level of origin of all the features in Area B, just under the charcoal stain, indicates that they are interrelated.

Occupation Area C is approximately 120 m south of Occupation Area B. The magnetic survey was conducted in this area of the site and several anomalies were selected for investigation. Although no cultural features other than rather diffuse ash stains were discovered, a cultural level 50 to 80 cm below the surface was encountered in several units. Occupation Area C, like Areas A and B, contained a predominantly hunting-oriented assemblage of points, bifaces, etc. Two whole points, a McKean lanceolate and a stemmed point, suggest a Middle Archaic association. Unfortunately, due to the lack of charcoal in this area, no radiocarbon dates were obtained.

The data suggest that Occupation Area A is a Late Prehistoric campsite where antelope processing took place. Area B appears to have been an extended Middle Archaic campsite with limited emphasis on animal processing. Area C may also date to the Middle Archaic and probably represents a short-term lithic reduction locale.

CHAPTER 6

48UT779

Introduction

Site 48UT779 is a stratified, multicomponent, prehistoric dune site. Three distinct cultural occupations were identified, the earliest dating to the Middle Archaic, a later undated occupation, and finally an intensive Late Prehistoric occupation just under the surface. Cultural material collected included 38 formal tools, 1122 pieces of debitage and a limited quantity of faunal remains.

Previous Investigations

The site was first recorded in 1982 during the cultural resource inventory of the Frontier Pipeline right-of-way. The survey team did not test the site, but the dark charcoal staining, tools and debitage eroding from the sand dunes at the site indicated the presence of subsurface cultural materials.

Field Methods

A total of 24 m² were excavated on the dune, in addition to 6 m² of excavations over magnetic anomalies (Fig. 44). None of the magnetic anomalies were cultural, but the main block excavations on the dune on the edge of the pipeline right-of-way produced 18 features and three stratigraphically distinct cultural levels (Fig. 45).

Site Setting

48UT779 is located on four low sand dunes which are part of a small sand dune field on the northeast side of Church Butte in the northeast corner of Uinta County, Wyoming, at an elevation of 1963 m. This dune field was formed by the accumulation of sands eroded from fluvial sandstone bedrock located in the area (Oviatt 1983) and probably developed in the last 5000 years.

The sand dune complex covers an area of about 80,000 m² and is bordered by a consolidated sandy silt and desert pavement overlying a

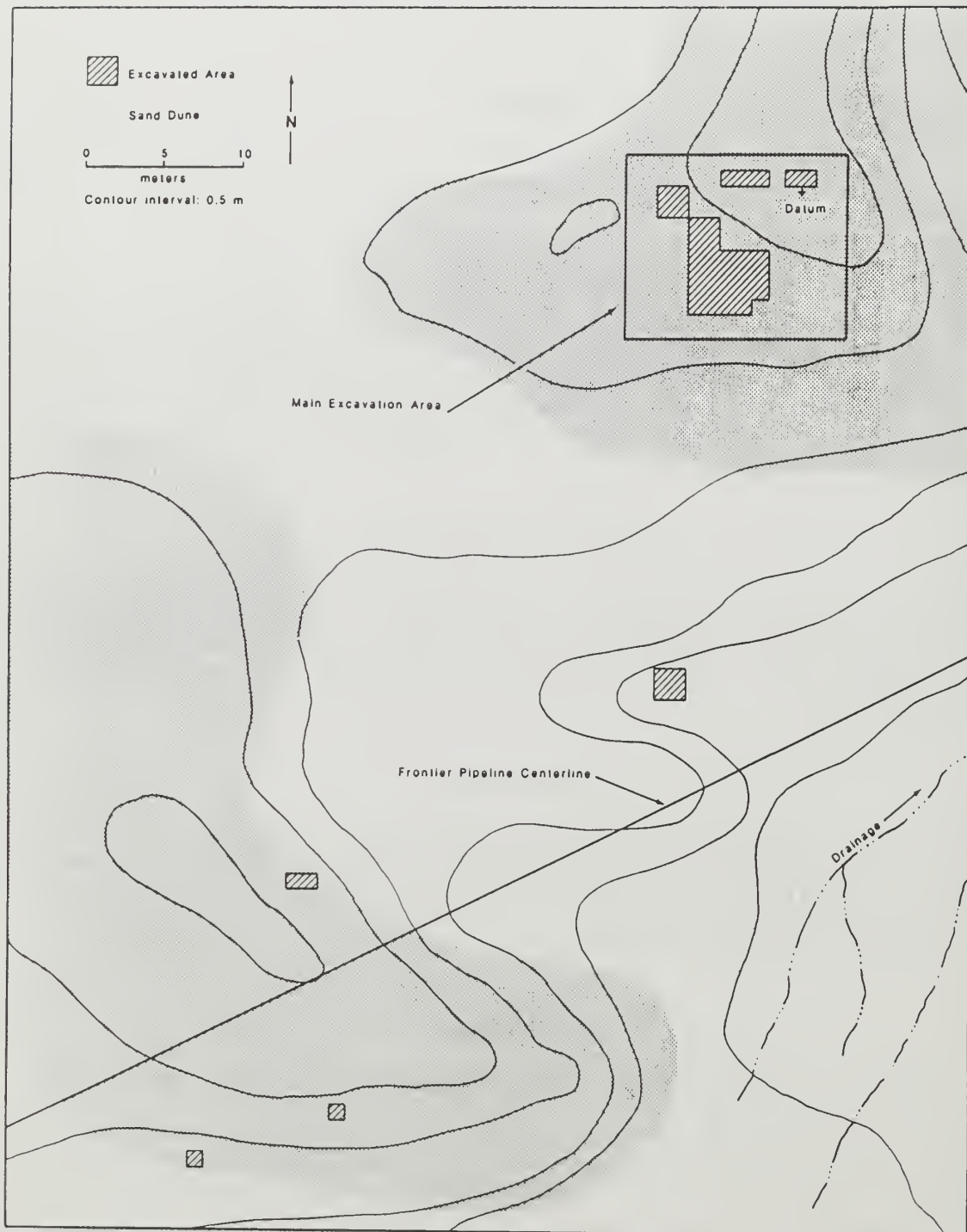


Fig. 44. Plan map of site area, 48UT779, Uinta County, Wyoming.

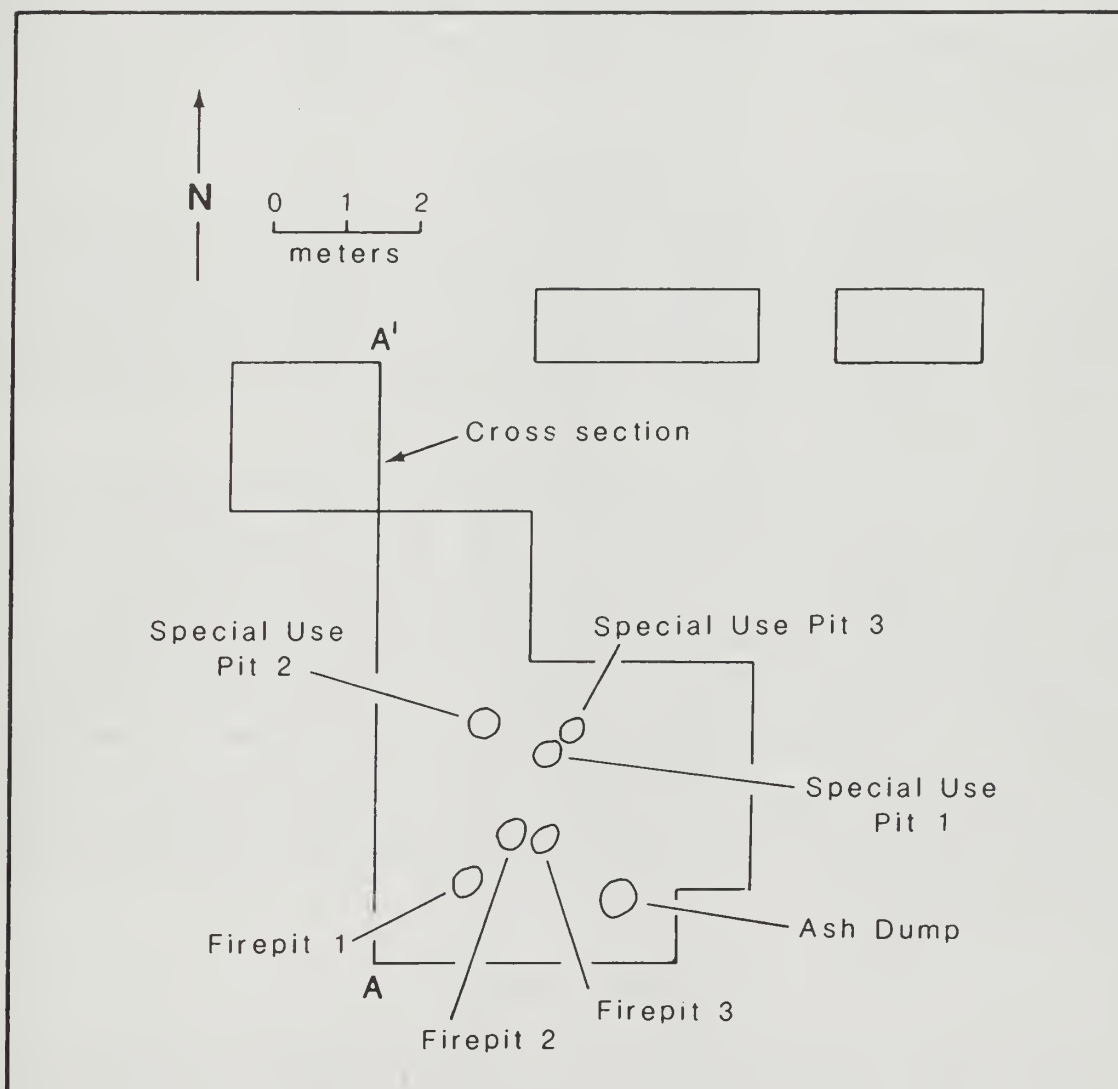


Fig. 45. Plan map of main excavation area and features, 48UT779, Uinta County, Wyoming.

bedrock sandstone. Cherts, chalcedonies and quartzites litter the surface of this desert pavement.

There is a large scarp to the southwest of the site from which cobbles of quartzites and cherts are eroding out. Several ephemeral drainages on this bench drain into the Blacks Fork River which is another 4.6 km to the northeast. The nearest bend of the Blacks Fork River, which is the closest permanent water source to the site, is located 1.7 km west.

A variety of plants and animals occur on and near the site. Vegetation on the site includes big sagebrush, greasewood, rabbitbrush, shadscale, Gardner saltbush, spiny hopsage, snakeweed, buckwheat, prickly pear cactus, Indian rice grass, needle-and-thread grass and wheat grasses. These dunes presently support a faunal community of pronghorn antelope, cottontail rabbit, Richardson's ground squirrels, least chipmunks and other small rodents.

Stratigraphy

Stratigraphy in the dunes consists of a tan eolian sand overlying a mixed silt, sand and clay matrix exhibiting varying grain sizes and compactness. The eolian deposits are estimated to be at least 3 m deep, although the excavation did not exceed 1.5 m. Unlike eolian deposits at 48UT199 and 48UT370, some color differences were visible in the profiles at this site. However, a great deal of rodent and root disturbance within the dune made correlation of strata difficult in places.

Stratum A, the lowest stratum encountered in the excavated area, is a dark brown, moderately compacted eolian sand that underlies Stratum C near the northern edge of the excavated area (Fig. 46). The earliest occupation at the site (Component 1), represented by a slab-lined hearth, was excavated into Stratum A and is radiocarbon dated 4670 ± 120 years:A.D. 2720 B.C. Stratum B is similar to Stratum A but contains a wide, poorly developed calcium carbonate horizon. Stratum C is a light brown/tan sand that was present throughout the excavated area. A later undated occupation, Component 2, is present at the interface of Stratum C and the underlying Stratum B. Stratum D, the uppermost stratigraphic level, is a tan sand loose to moderately compacted. This stratum included the latest cultural occupation, Component 3, and was radiocarbon dated at 1130 ± 80 years:A.D. 860. All cultural features, except the slab-lined hearth, originated within this stratum.

Cultural Features

Excavations at 48UT779 revealed a variety of cultural feature types. Features with oxidized or significant charcoal content are designated as firepits except in the case of one pit whose walls were lined with tabular sandstone slabs. A feature consisting of refuse from a firepit is designated an ash dump. Finally, three medium-sized pits with humic or charcoal-stained matrix are designated as special use pits. These special use

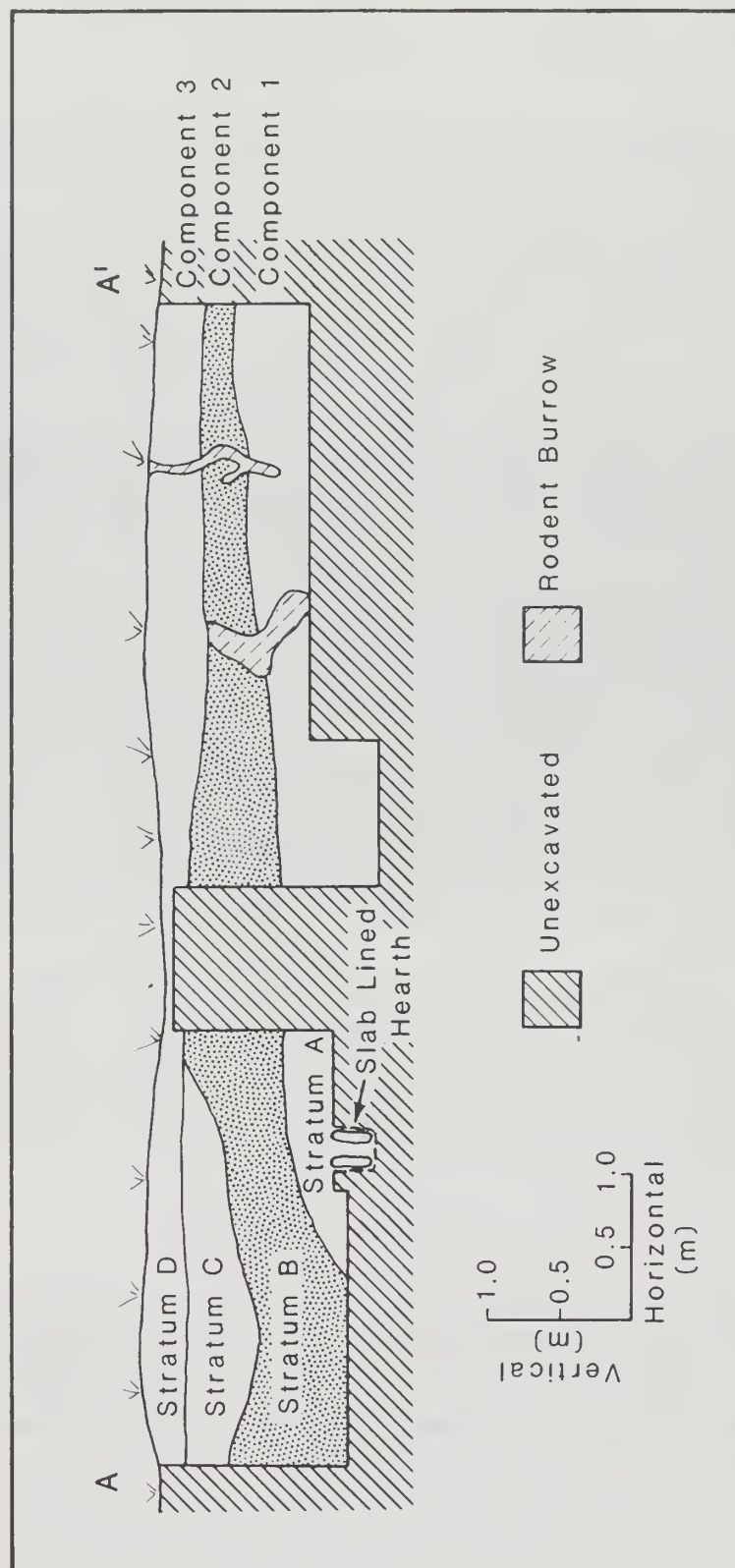


Fig. 46. Cross section of stratigraphy, 48UT779, Uinta County, Wyoming.

pits are problematic in that their function is not readily apparent. Individual features are described below.

Firepits

Firepit 1

Firepit 1 was the only surficial cultural manifestation within the main excavation area and was the reason for excavation in this area. The feature is a circular, basin-shaped pit measuring 58 cm north/south by 53 cm east/west with a maximum depth of 12 cm (Fig. 47). Matrix consisted of a black, charcoal-stained sand with associated thermally altered rock and rock shatter randomly scattered over the top of the feature, which also represents the present eroded ground surface of the sand dune. Within the pit, one 10 by 10 cm quartzite slab was noted, located at the bottom of the pit. A charcoal sample produced a radiocarbon date of 1130 ± 80 years:A.D. 860 (Beta 7275).

Firepit 2

Firepit 2 is an oval, shallow, basin-shaped pit measuring 60 cm north/south by 35 cm east/west with a maximum depth of 10 cm. Feature fill consisted of black, charcoal-stained sand with a small amount of charcoal and thermally altered quartzite (one cobble and some shatter). Artifacts noted in the matrix from the feature include one burned fragment of a large bone and one artiodactyl tooth fragment.

Firepit 3

Firepit 3 is an oval, basin-shaped pit measuring 65 cm east/west by 45 cm north/south with a maximum depth of 9 cm. Feature fill consisted of black, charcoal-stained sand with charcoal, burned and unburned clay. Artifacts noted within the feature fill include one burned chert biface, one chert core, several pieces of burned chert shatter and small fragments of bones.

Ash Dump

The Ash Dump is a concentrated area of thermally altered rock with a light ash stain measuring 57 by 56 cm with a depth of 8 cm (Fig. 48). A large amount of thermally altered quartzite shatter was noted over this area. There was no pattern to these rocks, which appear to have been dumped at this location and probably represent material discarded from another feature.



Fig. 47. Firepit 1, cross section, 48UT779, Uinta County, Wyoming.

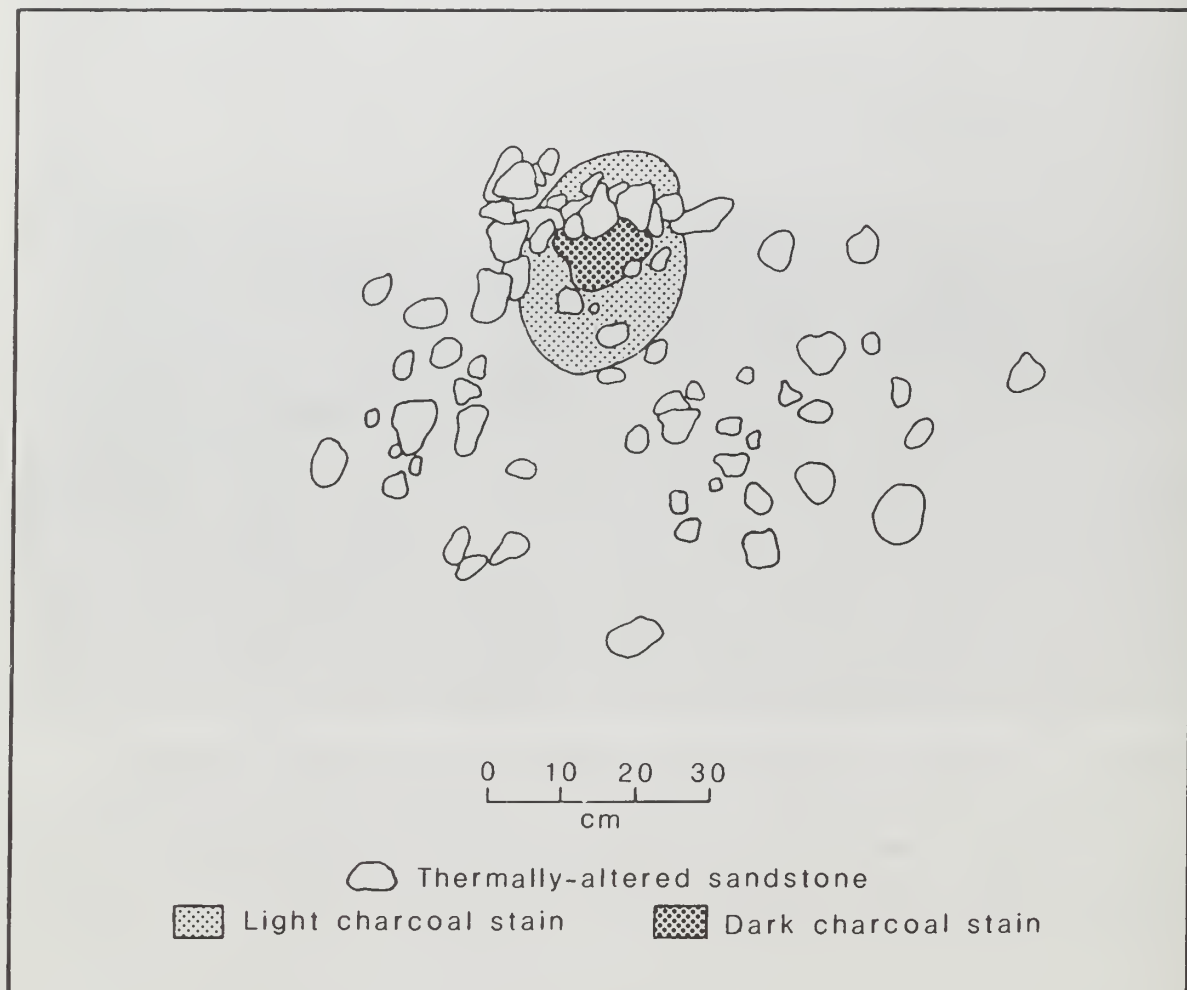


Fig. 48. Ash Dump, 48UT779, Uinta County, Wyoming.

Special Use Pits

Special Use Pit 1

Special Use Pit 1 is a circular, basin-shaped pit measuring 38 cm north/south by 36 cm east/west with a maximum depth of 20 cm. Matrix consisted of black, stained sand without charcoal, thermally altered rock or artifactual debris. Southeast of this feature within the same unit was a large (50 by 50 by 16 cm in depth) concentration of thermally altered quartzite shatter and several thermally altered quartzite cobbles. This rock concentration appears to be associated with this feature.

Special Use Pit 2

Special Use Pit 2 is a shallow, oval, basin-shaped pit measuring 40 cm east/west by 35 cm north/south with a maximum depth of 6 cm. This feature was badly disturbed by rodent burrowing. Feature fill consists of a dark, stained sand. No thermally altered rock, charcoal or artifactual debris were noted.

Special Use Pit 3

Special Use Pit 3 is a small, oval pit measuring 19 cm southwest/northeast by 12 cm southeast/northwest with a depth of 11 cm. Feature fill is a black, stained sand. No charcoal or thermally altered rock was noted in the fill but one fragment of bone was recovered from the feature.

Slab-lined Hearth

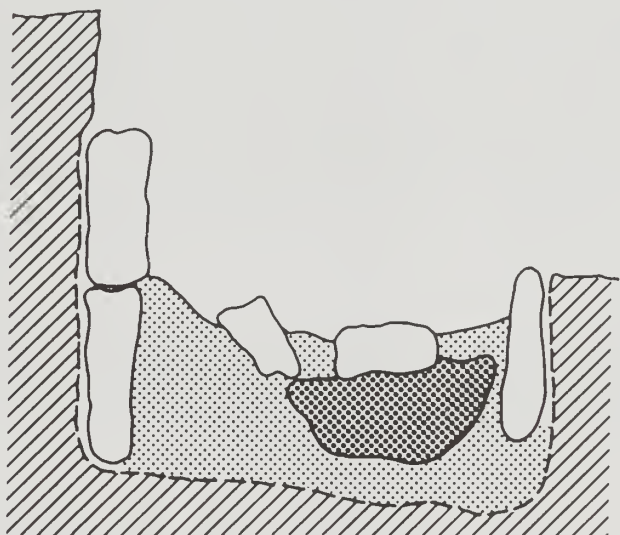
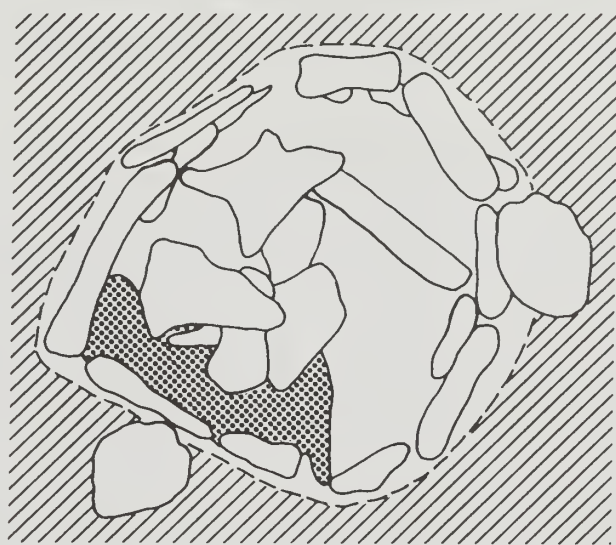
The Slab-lined Hearth is the only feature in the lowest cultural component at this site (Figs. 49, 50). Located 130 cm below the present ground surface, this feature measured 60 cm in diameter with a depth of 55 cm. This hearth consists of a deep pit whose edges are lined with approximately 35 tabular slabs of sandstone and quartzite. A number of tabular rocks were found about 30 cm into the feature fill. These rocks appear to be from a collapsed portion of the east wall of the hearth. Matrix below these rocks is a dark gray to black, charcoal-stained sand while the matrix in the upper portion of the hearth is a tan homogeneous sand. A C-14 sample collected from the lower portion of the hearth dated to 4670 ± 120 years:2720 B.C. (Beta 6945). A few pieces of debitage were noted in association with this feature.

Flaked Stone Artifacts

A total of 40 flaked stone artifacts (Table 17) and 1122 pieces of debitage were recovered during excavations at the site. These included three Rose Spring projectile points, one indeterminate projectile point fragment, one hafted knife, one blank, three preforms, two scrapers, ten



Fig. 49. Slab-lined Hearth, 48UT779, Uinta County, Wyoming.



0 20 40
cm





 Sandstone
  Gray ash stain
  Charcoal concentration
 Unexcavated

Fig. 50. Slab-lined hearth, plan view and cross section, 48UT779, Uinta County, Wyoming.

Table 17. Flaked stone artifacts from Component 3 by material type, 48UT779, Uinta County, Wyoming.

Artifact Class	Quartzite		Chalcedony			Chert							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
<u>Biface</u>													
Projectile points													
Rose Spring	0	0	0	0	1	0	0	1	1	0	0	0	3
Other fragments	0	0	1	0	0	0	0	0	0	0	0	0	1
Hafted knife	0	1	0	0	0	0	0	0	0	0	0	0	1
Blanks	0	0	0	0	0	0	0	0	0	1	0	0	1
Preforms	0	0	0	0	0	0	0	2	0	1	0	0	3
<u>Unifaces</u>													
Scrapers	0	1	1	0	0	0	0	0	0	0	0	0	2
<u>Modified flakes</u>													
Hafted modified flake	0	1	0	0	0	0	0	0	0	0	0	0	1
Notched flakes	0	0	0	0	0	0	0	1	0	0	0	0	1
Other modified flakes	0	0	0	0	0	1	0	7	0	0	0	0	8
<u>Cores and modified cobbles and pebbles</u>													
Cores	0	0	0	0	0	1	0	5	0	0	0	0	6
Modified cobbles and pebbles	0	1	2	0	0	0	0	8	0	0	0	0	11
<u>Hammerstones</u>	1	1	0	0	0	0	0	0	0	0	0	0	2
Total	1	5	4	0	1	2	0	24	1	2	0	0	40

modified flakes, six cores, two hammerstones and 11 minimally modified cobbles and pebbles. All of the formal tools are from the Late Prehistoric Occupation, Component 3. One blank and two cores were recovered from Component 2.

Bifaces

A total of nine bifaces were recovered during excavation. These include four completed and fragmentary projectile points, one hafted knife, one blank and three preforms.

Projectile Points

Rose Spring

Three Rose Spring points (cf. Lanning 1963) were recovered at 48UT779 (Table 17). These points have small, triangular blades with slightly serrated edges, corner/basal notches that form tanged shoulders and slightly expanding stems (Fig. 51a-c). The Rose Spring points recovered from this site are similar in size to those from the Austin Wash Site (Chapter 4). The only complete specimen is 25.0 mm long, 14.0 mm wide, 2.0 mm thick and 5.6 mm wide at the base. It is made from a brown chert flake with only marginal lateral retouch on all sides. Of the other two, one is missing the tip and is made of moss agate, and another lacks the stem and is of algalitic chert. Two Rose Spring points were recovered in Component 3. The third probably also originated in this component but was found in a rodent disturbed area in Component 2.

Other Fragment

One small, basal fragment of a projectile point was found at the site. It has a convex base with a portion of an expanding stem and is made of moss agate.

Hafted Knife

One stemmed quartzite hafted knife was recovered (Fig. 51d). The stem of this knife is slightly asymmetrical. Both blade edges are excurvate and have serrations. Notches are not well defined and the stem is crudely manufactured. The lateral edges are alternately worked, producing a beveled or rhomboidal cross section. It is 42 mm long, 16 mm wide and 6 mm thick. The neck width is 12 mm. This knife was found in Component 3.

Blanks

Only one bifacially worked artifact recovered at the site is included in the blank category (Table 17). This crudely flaked biface was made

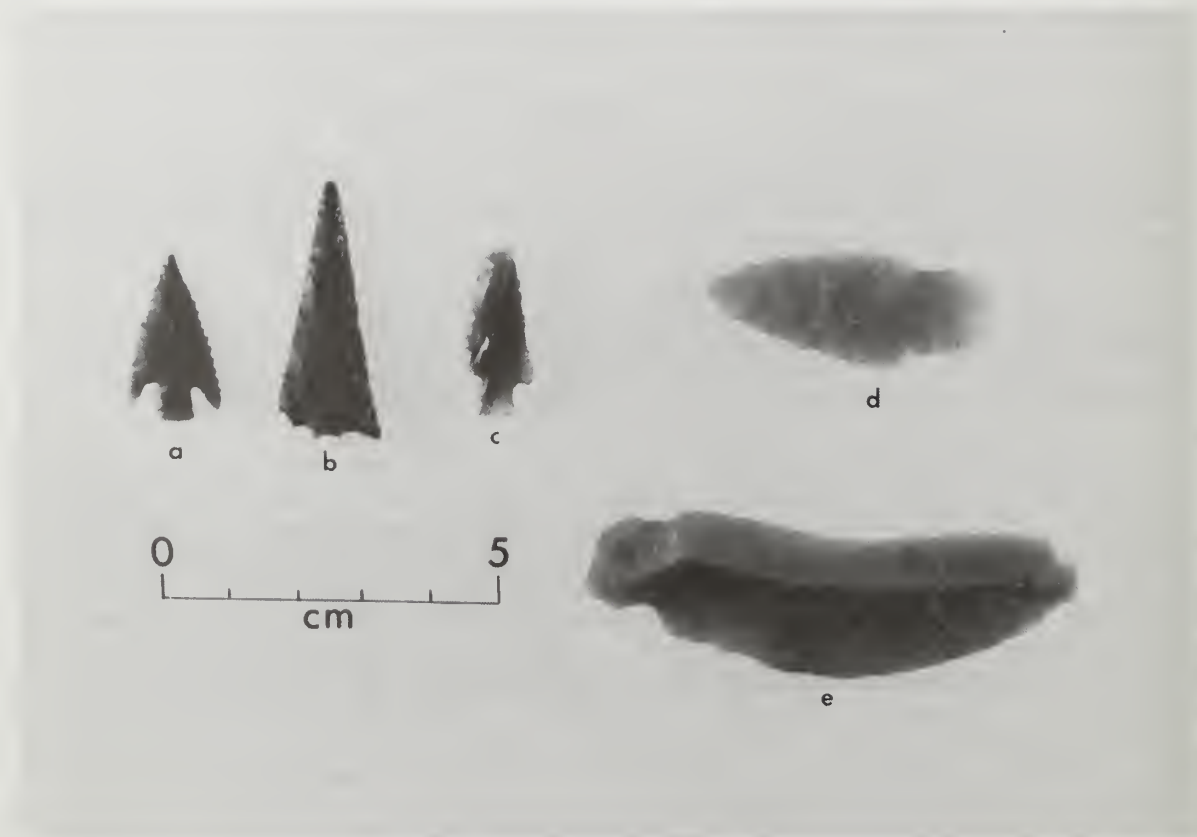


Fig. 51. Projectile points and tools, 48UT779, Uinta County, Wyoming. a-c, Rose Spring points; d, hafted knife; e, hafted retouched flake

from a thin chert pebble of chert. It is fairly irregular in outline and has cortex on both surfaces. Though missing one end, it is 60 mm long, 38 mm wide and 12 mm thick. The artifact appears to have been broken during manufacture. It was found in Component 2.

Preforms

Three small biface fragments found in Component 3 are classified as preforms (Table 17). Two are portions of tips and the other is a fragment from an edge of a biface. All have fairly regular outlines and are made from chert.

Unifaces

Scrapers

Two artifacts with unifacial flaking are identified as scrapers (Table 17), the only unifacial tools recovered from the site. One specimen, made from a tabular piece of algalitic chert, is crudely flaked around three edges. Both surfaces exhibit cortex. It is 69 mm long, 43 mm wide and 11 mm thick. The other artifact is a decortication flake of moss agate with fine retouch around three margins. It is 50 mm long, 48 mm wide and 17 mm thick. They were both found in Component 3.

Modified Flakes

Hafted Modified Flake

One long, thin blade flake with notches that form a slightly asymmetrical stem was recovered from Component 3 (Fig. 51e). The stem is similar to the one of the hafted knife. The notches are flakes from alternate surfaces and fine retouch occurs along the margin of the flake. The flake is made from quartzite and is 72 mm long, 21 mm wide at the notches and 14 mm wide at the stem base.

Notched Flakes

An irregular chunk of algalitic chert with a deep, well-defined notch was recovered from Component 2. Cortex covers most of the dorsal surface with the vertical surface displaying several flake scars. One edge also appears to have been battered. It is 96 mm long, 48 mm wide and 29 mm thick.

Other Modified Flakes

Eight flakes recovered at this site exhibit fine retouch at least along one edge, seven are of algalitic chert and the other is of Granger Green chert (Table 17). Though most of the retouch appears to be the result of intentional manufacture, some of it may be accidental breakage due to trampling. All were found in Component 3.

Cores and Modified Cobbles and Pebbles

Cores

Six cores were recovered at the site; five are angular chunks of algalitic chert and one is a chunk of Granger Green chert (Table 17). Each contains several flake scars that are, except for one specimen, randomly distributed. One core has been bifacially flaked. Four are from Component 3 and two are from Component 2.

Modified Cobbles and Pebbles

Eleven specimens which exhibit only minimal modification are included in this category (Table 17). Eight are angular chunks of tabular algalitic chert with only one or two flake scars. These were probably flaked to test the quality of the material. Two pebbles of moss agate contain a few flake scars along one or two edges. A cobble of quartzite is longitudinally sectioned. All are from Component 3.

Debitage

Table 18 presents debitage sorted by reduction stage and material type. The debitage shows the greatest relative frequency of algalitic chert (63.1%) of all the sites excavated. The remainder of the collection is made up of mottled chert (10.2%), quartzite (7.7%) and various other cryptocrystalline silicas. The relative frequencies of the debitage categories follow the same basic pattern encountered at the other sites, gradually increasing through the secondary thinning stage and dropping slightly at the final shaping stage. The most notable contrast to the other sites is the high proportion of shatter which makes up 37% of the collection as opposed to 8.3 to 22.2% at the other sites.

Table 19 presents the same data sorted by component (Fig. 52). Few statements can be made about the small collection from Component 1 other than to note the dominance of algalitic chert and the presence of all bifacial reduction stages. Component 2 includes a wider variety of raw materials including obsidian, with algalitic chert again most common. All stages of bifacial lithic reduction are present. The last component shows the greatest uniformity in raw material type with algalitic chert making up 74.8% of the collection. It is this component which contributes the

Table 18. Frequency of debitage by reduction stage and material type,
48UT779, Uinta County, Wyoming.

Reduction Stage	Quartzite			Chalcedony			Chert					Obsidian	Other	Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algaittic	Solid Brown	Solid Other	Mottled/Speckled			
Decortication	0	20	3	4	2	2	4	28	1	0	0	0	0	64
Initial reduction	0	7	0	0	0	5	2	81	3	0	7	0	0	105
Primary thinning	0	4	0	0	1	3	3	84	2	0	17	0	0	114
Secondary thinning	0	3	0	1	2	5	3	68	9	3	25	0	1	120
Final shaping	0	2	1	1	8	2	0	42	10	2	14	0	1	83
Indeterminate	0	16	3	0	4	3	4	150	17	2	19	0	2	220
Other	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Total flakes	0	52	7	6	17	20	16	454	42	7	82	0	4	707
Shatter/chunks	1	34	5	2	1	3	4	310	16	2	32	5	0	415
Total debitage	1	86	12	8	18	23	20	764	58	9	114	5	4	1122

Table 19. Reduction stage of debitage by material type and component, 48UT779, Uinta County, Wyoming.

Reduction Stage	Quartzite		Chalcedony			Chert								Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Obsidian	Other	
Component 3														
Decortication	0	16	2	4	2	1	4	20	0	0	0	0	0	49
Initial reduction	0	6	0	0	0	3	2	71	0	0	6	0	0	88
Primary thinning	0	2	0	0	1	1	3	68	1	0	12	0	0	88
Secondary thinning	0	2	0	1	2	2	2	53	5	0	20	0	1	88
Final shaping	0	2	1	1	8	0	0	31	6	1	12	0	0	62
Indeterminate	0	14	3	0	4	3	4	126	16	1	9	0	2	182
Other	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Total flakes	0	42	6	6	17	10	15	370	28	2	59	0	3	559
Shatter/chunks	1	29	5	2	1	3	4	251	10	1	28	4	0	339
Total debitage	1	71	11	8	18	13	19	621	38	3	87	4	3	897
Component 2														
Decortication	0	3	1	0	0	1	0	7	1	0	0	0	0	13
Initial reduction	0	1	0	0	0	2	0	9	3	0	1	0	0	16
Primary thinning	0	2	0	0	0	2	0	11	1	0	4	0	0	20
Secondary thinning	0	1	0	0	0	3	1	12	4	3	4	0	0	28
Final shaping	0	0	0	0	0	2	0	11	2	1	0	0	1	17
Indeterminate	0	2	0	0	0	0	0	14	0	1	7	0	0	24
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total flakes	0	9	1	0	0	10	1	64	11	5	16	0	1	118
Shatter/chunks	0	5	0	0	0	0	0	51	5	1	1	1	0	64
Total debitage	0	14	1	0	0	10	1	115	16	6	17	1	1	182
Component 1														
Decortication	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Initial reduction	0	1	0	0	0	0	0	1	0	0	0	0	0	2
Primary thinning	0	0	0	0	0	0	0	5	0	0	1	0	0	6
Secondary thinning	0	0	0	0	0	0	0	3	0	0	1	0	0	4
Final shaping	0	0	0	0	0	0	0	0	2	0	2	0	0	4
Indeterminate	0	0	0	0	0	0	0	10	1	0	3	0	0	14
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total flakes	0	1	0	0	0	0	0	20	3	0	7	0	0	31
Shatter/chunks	0	0	0	0	0	0	0	8	1	0	3	0	0	12
Total debitage	0	1	0	0	0	0	0	28	4	0	10	0	0	43
Grand Total	1	86	12	8	18	21	23	764	58	9	114	5	4	1122

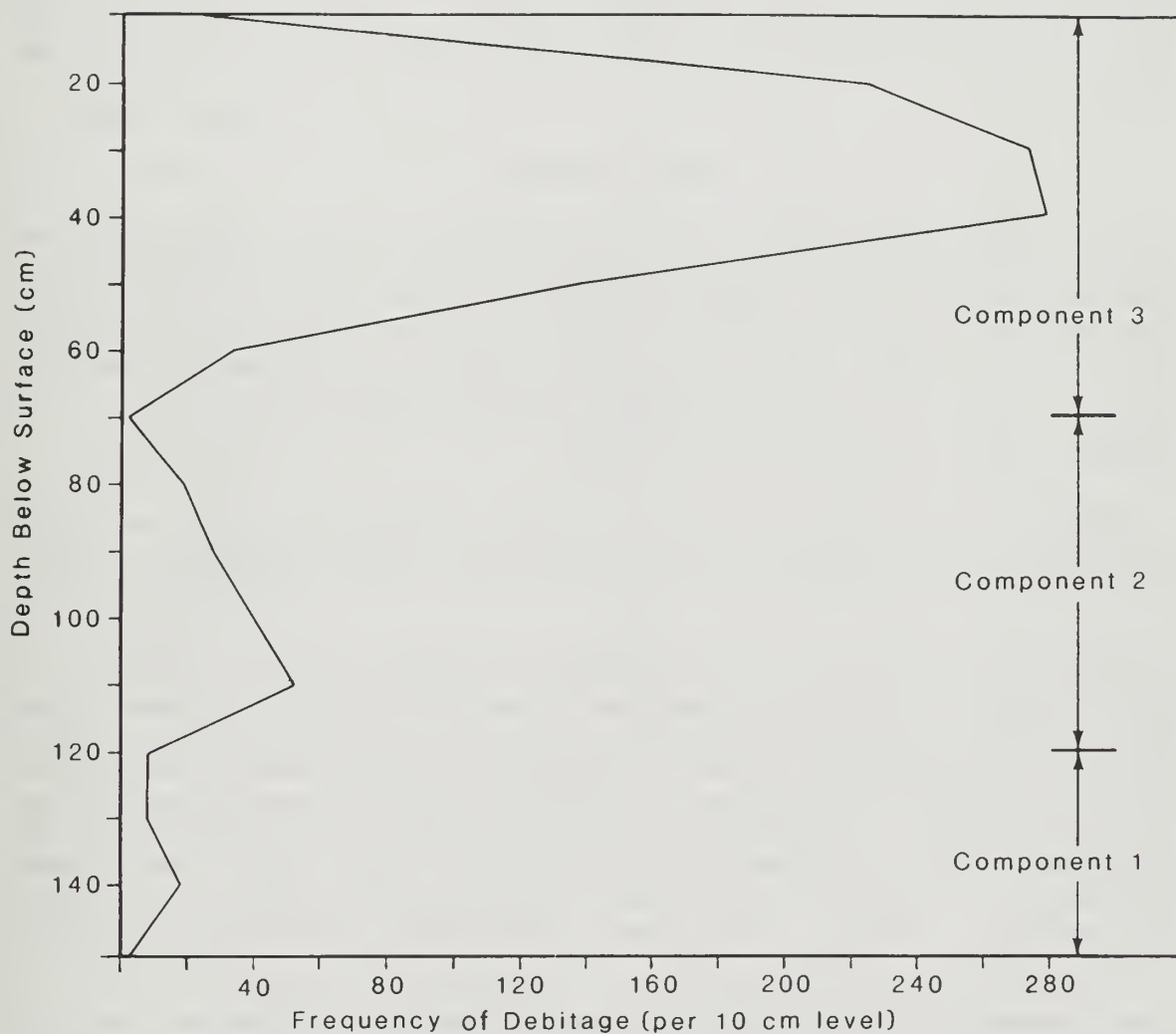


Fig. 52. Distribution of debitage by depth, 48UT779, Uinta County, Wyoming.

greatest amount of shatter to the site assemblage. Evidence of thermal alteration, crazing and pot-lid scars, was noted among the debitage during excavation and analysis. This process is intended to improve the conchoidal fracturing characteristics of the raw material (Purdy 1975) and may account for the higher frequency of nondiagnostic shatter. Some of the heated raw material may have simply exploded due to heat expansion of internal impurities producing shatter rather than conchoidal flakes.

Hammerstones

Two hammerstones were recovered from Component 3. One is a purple quartzite cobble exhibiting evidence of battering on opposing ends of the longitudinal axis. It is 69 mm long, 43 mm wide and 11 mm thick. The other hammerstone, a quartzite cobble, displays battering scars along one end of the longitudinal axis. It is 77 mm long, 58 mm wide and 21 mm thick.

Faunal Analysis

A total of 384 pieces of bone were collected from excavations at 48UT779. Identifiable bone represents 28% of the total and 21% of the total was burned. Taxa identified from the faunal remains include pronghorn antelope, dog, jackrabbit, cottontail, prairie dog, ground squirrel, pocket gopher, vole and birds (Table 20). Rodents and lagomorphs represent 80% of the total of the identifiable bone with pronghorn representing 20%. However, the bulk of the collection are unidentified large mammal bone fragments which are most likely antelope.

Faunal remains were noted in all three cultural components. Component 1 contained 14 bone fragments and Component 2, 28 bone fragments. Cultural Component 3 contained the bulk of the collection, over 300 specimens.

The faunal collection from 48UT779 is sparse. Much of the rodent and lagomorph bone was found in association with modern animal burrows, and more than 50% could not be identified to species, although the 213 large mammal fragments are probably antelope. The burned bone was noted in close proximity to the various features associated with the three cultural components. In Cultural Component 1, the burned bone was associated with the slab-lined hearth. In Cultural Component 2, most of the burned bone was associated within a concentration of thermally altered rock. In Cultural Component 3, a concentration of burned bone was noted in the areas around the features. Only the antelope and large mammal fragments were burned.

Five bones from Cultural Component 3 exhibited two types of modification, butchering marks and scraping marks. Four of the bones are antelope and one is from a small, medium-sized mammal. The small mammal bone is an unidentifiable, long bone fragment burned with cut marks. The modified antelope bone consists of one ulna midshaft fragment with longitudinal striations or cut marks and one medial rib fragment exhibiting cut marks.

Table 20. Faunal remains from 48UT779,
 Uinta County, Wyoming.

Taxa	Component (NISP)				Site Total	
	1	2	3	Unknown	NISP	MNI
Antelope (<u>Antilocapra americana</u>)	1	1	19	0	21	1
Large mammal	8	16	188	1	213	0
Dog (<u>Canis</u> sp.)	0	0	0	2	2	1
Jackrabbit (<u>Lepus townsendii</u>)	0	6	2	0	8	1
Medium mammal	0	0	10	1	11	0
Cottontail (<u>Sylvilagus</u> sp.)	0	0	61	7	68	4
Prairie dog (<u>Cynomys leucurus</u>)	1	0	3	0	4	3
Ground squirrel (<u>Spermophilus</u> spp.)	1	3	1	0	5	1
Pocket gopher (<u>Thomomys talipoides</u>)	1	0	2	1	4	2
Vole (<u>Microtus</u> sp. or <u>Lagurus</u> sp.)	1	0	0	0	1	1
Small mammal	0	1	21	3	25	0
Bird (raptor)	0	0	1	0	1	1
Bird shell	1	0	2	0	3	0
Mussel shell	0	0	2	0	2	1
Unidentifiable	0	1	15	0	16	1
Total	14	28	327	15	384	17

NOTE: NISP = Number of Identified Specimens per Taxon; MNI = Minimum Number of Individuals.

The small size of the faunal collection limits the kind of interpretations that can be made. All species represented in the sample are presently found in the immediate area of the site and the disturbed context of most of the rodent and rabbit bone decreases the potential for cultural association. The burned bone, the best evidence for cultural association, suggests that the aboriginal occupants primarily utilized antelope and large mammals. Seasonality of site occupation could not be addressed by the faunal data.

Mussel Shell

Two small fragments of mussel shell were collected from the excavation units. One was located within the fill from Firepit 2 and the other from just outside the gray stained area associated with the features. The two specimens measure 11 by 7 mm and 15.0 by 8.4 mm. No evidence of burning or modification were evident on either specimen.

Egg Shell

Three small fragments of beige colored egg shell were collected from the excavations. Specimens were collected from the subsurface with two specimens from Component 3 and one from Component 1.

Plant Macrofossil Analysis

A total of 461 charred seeds were recovered from six of the eight features examined at 48UT779 (Table 21). These seeds consist of goosefoot (Chenopodium sp.), strawberry (Frageria sp.), sunflower (Helianthus sp.) and willow (Salix sp.). Of the features analyzed, Firepit 3 had by far the most variety and largest quantity of seeds. The slab-lined hearth, dating to the Middle Archaic, lacked seeds.

Summary and Conclusions

48UT779 is a multicomponent site located within a small sand dune complex east of Church Butte in the northeast corner of Uinta County, Wyoming. Archeological investigations at the site revealed three distinct, stratified cultural components in the easternmost dune at the site. Although the sample was small, the collected cultural material allows some speculation about the cultural chronology and function of the site.

Cultural Component 1 was located 1.2 m below the surface of the sand dune in the southwestern area of the excavations. Only 5 m² were excavated to this depth. Cultural material associated with this component include 43 pieces of lithic debitage and 14 pieces of bone representing pronghorn antelope and rodents. Only one feature was located in association with this component, a slab-lined hearth radiocarbon dated to about 2770 B.C.

Table 21. Distribution of charred seeds
at 48UT779, Uinta County, Wyoming.

Sample	<u>Chenopodium</u>	<u>Frageria</u>	<u>Helianthus</u>	<u>Salix</u>	Total
Firepit 1	81	7			88
Firepit 2	16	1			17
Firepit 3	192	28	2	9	231
Ash Dump 1	6				6
Special Use Pit 1	84	3		1	88
Special Use Pit 2					0
Special Use Pit 3	31				31
Slab-lined Hearth					0
Total	410	39	2	10	461

Cultural Component 2 was identified at about 60 cm below the present dunal surface. This component included 181 pieces of lithic debitage and 28 bone fragments. All stages of lithic reduction are represented in the debitage sample. No features were uncovered in this component, but a concentrated area of thermally altered rock was noted. Diagnostic tools were also absent from the material collected from this component, no cultural affiliation or temporal association can be assigned to this component.

Cultural Component 3, exposed from 1 to 40 cm below the present ground surface, consisted of a large activity area with features, diagnostic artifacts and a well defined lithic reduction sequence. Bone recovered from this component represented at least six different types of animals, but was very fragmented. Speculation to the number of animals per taxa represented at the site is difficult due to the state of the bone, but regardless of the bone condition, the evidence suggests that only a few animals were utilized at the site. Seven features were recorded in Component 3, three firepits, three special use pits and one ash dump. A radiocarbon sample was submitted from one of the firepits and was dated at A.D. 870, which correlated with the diagnostic projectile point types recovered from Component 3. One of the other fire hearths had a concentrated area of thermally altered quartzite shatter located next to the hearth. Thermally shattered pieces of chert were noted predominantly in the southern half of the excavation area concentrated in the areas around the three firepits. Three Rose Spring points were recovered from this component.

Cultural material collected from excavations at 48UT779 demonstrate that during at least three periods of time in the past, people were living at this site. The earliest occupation was dated at about 2700 B.C. This component was only partially excavated and conclusions about the function of this component are speculative at best. Cultural Component 2 produced more material than Component 1, but no features or diagnostic tools were recorded. The artifact assemblage recovered from Cultural Component 3 supports lithic procurement and reduction as one of the primary functions for this occupation. The three firepits recorded in this component are small, shallow basins, not generally the size attributed to roasting pits, although there is some evidence from the faunal remains and the charred seeds that these hearths may have been used for cooking.

The distribution of cultural material around the firepits suggests that the hearths were periodically cleaned out and reused. The tool assemblage recovered from this component included cutting implements, as well as projectile points, indicating some food processing, in addition to lithic procurement and reduction, were taking place during the Late Prehistoric occupation at the site. The charred seeds from this site present the best evidence that Component 3 represents a short-term occupation with a balance hunting/gathering subsistence economy.

CHAPTER 7

48UT370

Introduction

48UT370 is a large, multicomponent site covering four sand dunes about 5 km northeast of Church Butte. Three of the sand dunes in the pipeline right-of-way contain evidence of Late Prehistoric occupation. Another lowlying sand dune southwest of the pipeline route contains evidence of Early Archaic occupation. The bulk of the 1983 excavations were conducted on this dune.

Previous Investigations

Site 48UT370 was recorded by the Laboratory of Public Archaeology in June of 1980 during the inventory for the MAPCO pipeline. The initial site form indicates the site consisted of a single dune with 10 to 15 flakes, two bifaces, two cores, three choppers and some thermally altered rock.

During a reinventory of the MAPCO pipeline, the site was relocated, mapped, collected and tested in October, 1980. Further work was recommended for the site, and in 1981 a crew returned to the site and conducted additional testing (Miller 1982). This additional testing resulted in the discovery of a buried Early Archaic activity area.

Field Methods

The 1980 datum was relocated near Dune B and was established as the 500 North, 500 East datum for the 1983 excavations. Because cultural materials had been previously identified on four of the dunes (A-D) at this site (Fig. 53), two backhoe trenches were placed along the pipeline centerline on Dunes A and B. An additional small trench and block area were hand excavated on Dune A near a concentration of thermally altered rock. The backhoe testing and the hand excavation failed to produce any subsurface material.

Five magnetic anomalies were excavated on a 20 by 20 m grid on Dune B. None produced evidence of subsurface cultural features or artifact concentrations. Because of lack of material on Dune C, no excavations were

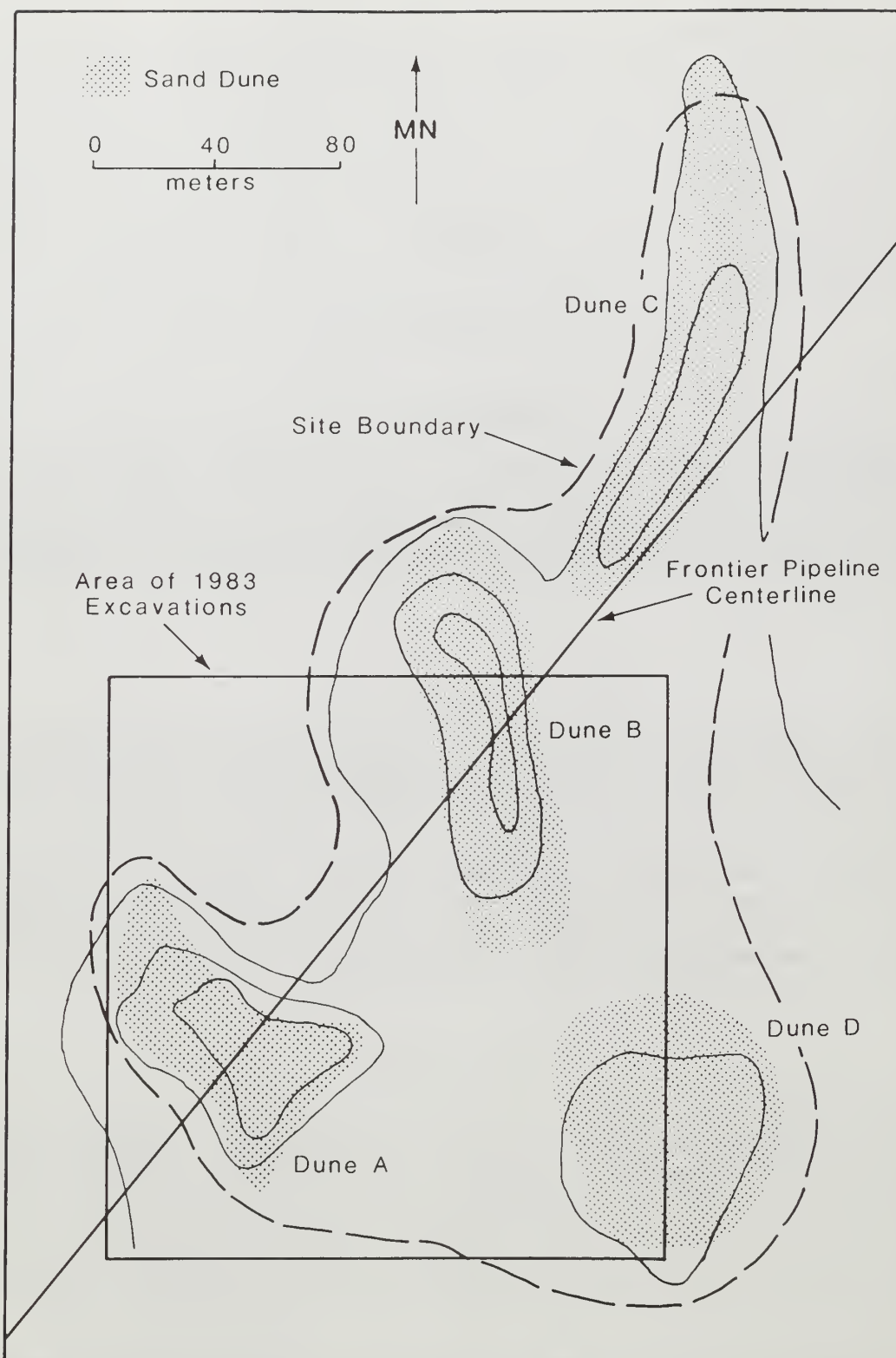


Fig. 53. Plan map of the four sand dunes on 48UT370, Uinta County, Wyoming.

conducted on that dune. The major effort in 1983 concentrated on Dune D where about 100 m² were excavated.

Site Setting

Site 48UT370 is located on four sand dunes (A-D) in a dune field which surrounds the badland scarp south and east of the Blacks Fork River near Church Butte Historical Landmark (Fig. 54). Sand Dunes A, B and C are located along the Frontier pipeline rise approximately 3 m above the surrounding desert pavements while Dune D, to the south of the pipeline corridor, rises only 1 m. However, this smaller dune is flanked to the north and west by an apron of eolian deposited sand that appears to be a sand-filled depression in the old ground surface.

An ephemeral drainage, Bruff Draw, flows within 20 m of the site and is the closest source of water. The nearest permanent source of water is the Blacks Fork River 4 mi (6.5 km) north of the site. The vicinity of 48UT370 is criss-crossed with ephemeral drainages and provides intermittent sources of water.

The basal soil in the area is an argillic desert pavement with chert, quartzite, chalcedony, and agate pebbles and small cobbles. All of these material types are present in the lithic assemblage at the site. Eolian sand dunes are present on site and contain the subsurface cultural deposits.

Vegetation on the sand dunes is dominated by large sage with rabbit-brush, greasewood, four-winged saltbush and shadscale. Grass cover is predominantly Indian rice grass with wheat grass, blue grass and needle-and-thread grass. Forbs include yellow bee plant and sand dock. The sparsely vegetated desert pavement supports Gardner saltbush, low sagebrush and biscuitroot. Disturbed areas along roads and pipelines are vegetated primarily with halogeton and Russian thistle.

Recent disturbance on the site is primarily due to several pipelines which bisect the site and a buried telephone cable immediately to the south of the site. A fence also crosses the western portion of the site. Minor surface damage to the site has also occurred due to cattle grazing.

Stratigraphy

The dunes within the site, and in the general vicinity, tend to be slightly steeper along the eastern faces with interbedded small lenses of pond marls characterized by shallow crescents of concentrated calcium carbonate (Oviatt 1983). The general impression given by several deep profiles was of undifferentiated depositional episodes from top to bottom. The only clearly visible differences within the profiles in Dune D are poorly developed, lightly colored bands of higher calcium carbonate accumulations ranging from 15 to 30 cm thick and occurring 15 to 50 cm below

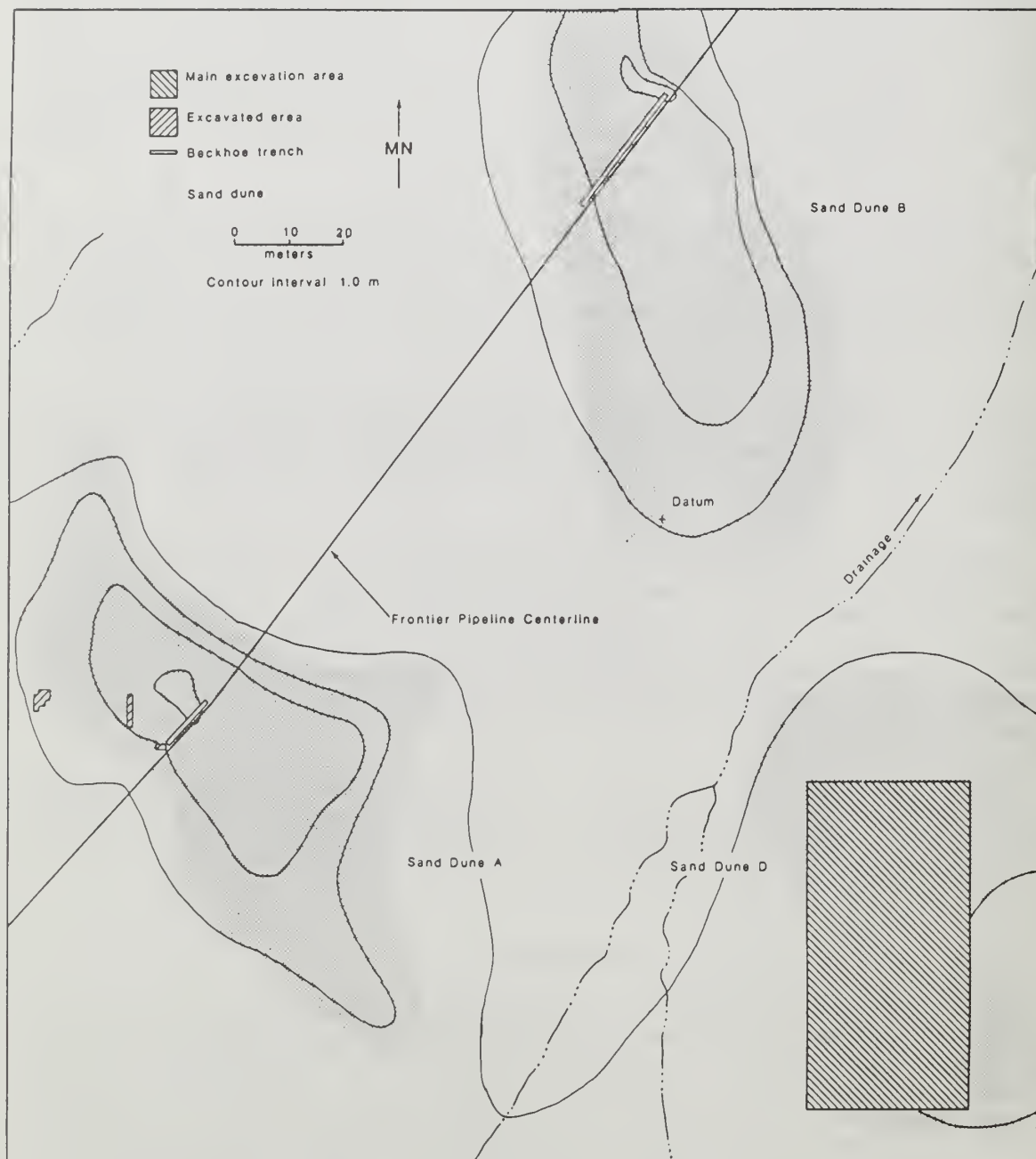


Fig. 54. Plan map of major dunes on 48UT370, Uinta County, Wyoming.

present ground surface. In general, the artifactual material in this area was found below these bands of calcium carbonate.

Cultural Features

Two firepits and one ash dump were located as a result of excavations by P-III Associates in Dune D (Fig. 55). Firepit 1 was discovered in a backhoe trench. Firepit 2, the Ash Dump and a large charcoal-stained area were discovered in an area near the 1981 excavations. Firepit 3 and the Special Use Pit, also associated with a stained area, were found during the 1981 excavations at Dune D (Miller 1982).

Firepits

Firepit 1

Firepit 1 was sectioned by the backhoe during exploration of Dune D. The feature was approximately 1.1 m below the surface in what appears to be a rather large sand-filled depression. Approximately 10 m² area was excavated adjacent to this feature from which a limited amount of cultural material was recovered. Firepit 1 was 55 cm across and 26 cm deep. The fill consisted of black sand, small pieces of charcoal and several very small pieces of thermally altered rock. A soil sample from this feature was radiocarbon dated 4290 \pm 150 years:2340 B.C. (Beta 7278).

Firepit 2

Firepit 2 was located on the northwest slope of Dune D 40 cm below the surface. The pit walls sloped gently inward forming a rounded bottom (Figs. 56, 57). The pit fill was a light gray with charcoal scattered throughout. Some rodent activity was evident near the top of the feature. A pale, orangish yellow oxidation ring was sporadically present along the pit walls. One bifacially reduced core was recovered from the feature fill. Charcoal from this feature was radiocarbon dated 6480 \pm 340 years: 4530 B.C. (Beta 7270).

Firepit 3

Firepit 3 was discovered and excavated in 1981 and is labelled Feature 3a in the report of those excavations (Miller 1982). This basin-shaped feature was located about 5 m southwest of Firepit 2 at 35 to 55 cm below the surface. It measured 40 by 64 cm and contained dark stained sand mixed with a few very small pieces of thermally altered rock.

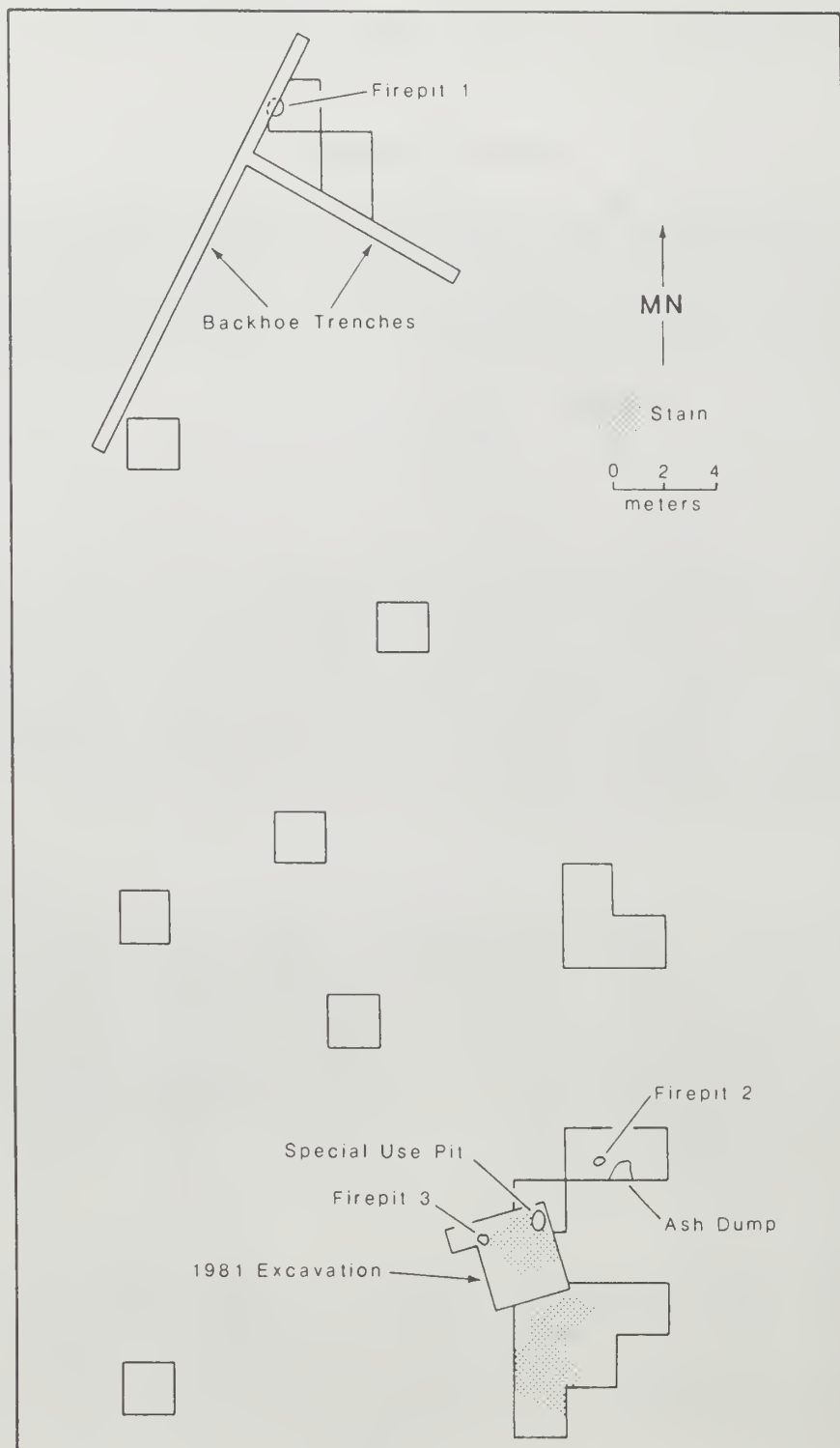


Fig. 55. Plan map of main excavation area and features in Dune D, 48UT370, Uinta County, Wyoming.

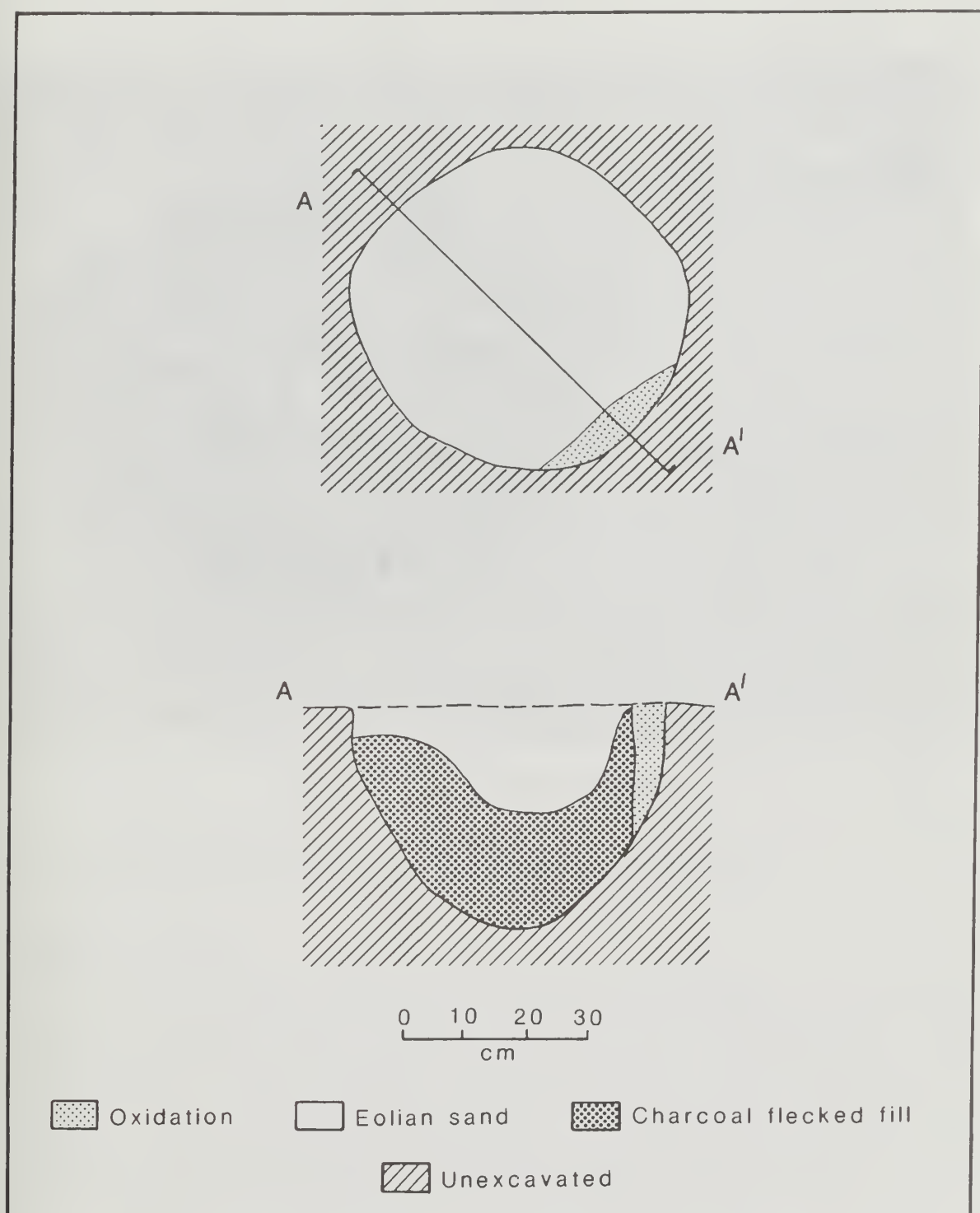


Fig. 56. Firepit 2, plan view and cross section, 48UT370, Uinta County, Wyoming.

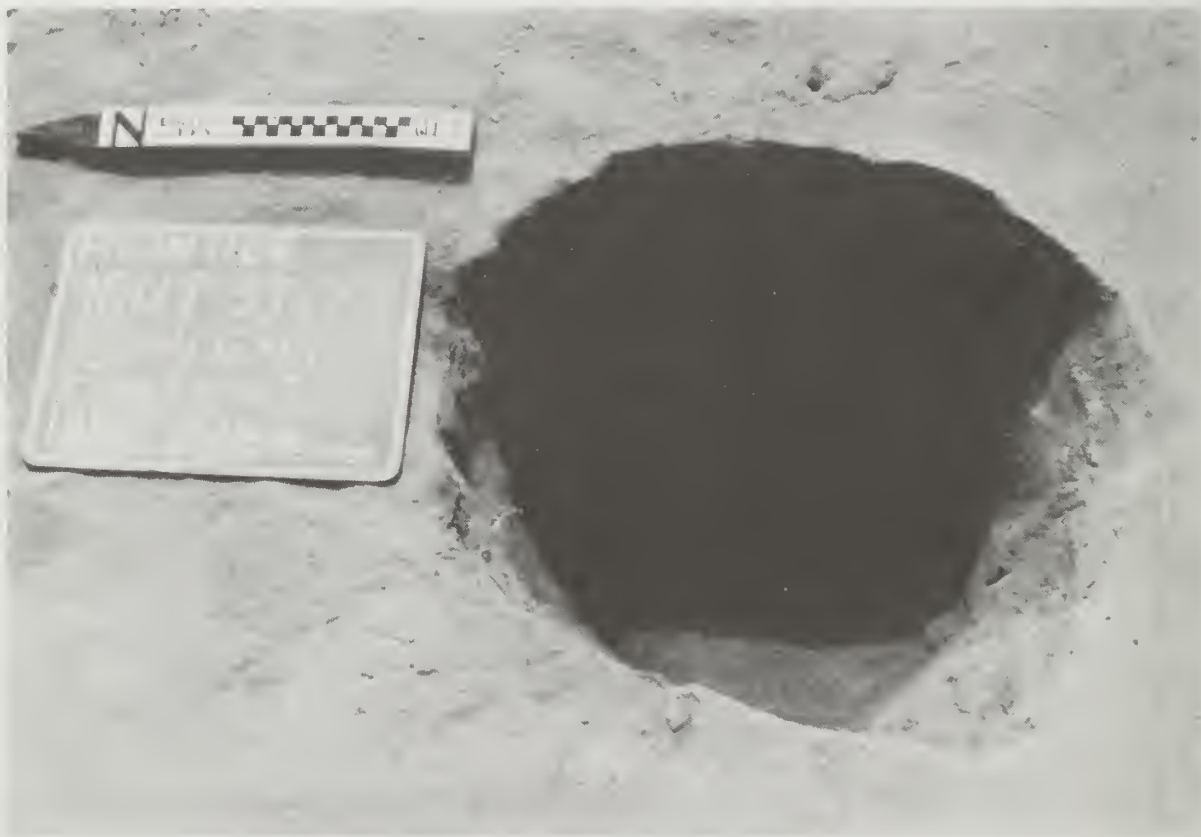


Fig. 57. Firepit 2, 48UT370, Uinta County, Wyoming.

Ash Dump

Approximately 15 cm southeast of Firepit 2 was a gray-stained area designated as an Ash Dump. This stain was approximately 1 m² and had a maximum depth of 10 cm. Both the horizontal edges and profile were very irregular and no evidence of a pit was present. Very little cultural material was present in the feature fill other than some small charcoal flecks.

Special Use Pit

The Special Use Pit was excavated in 1981 and is labelled Feature 3b in the report describing those excavations (Miller 1982). This pit, measuring 80 cm in diameter, was located approximately 1 m east of Firepit 3 and extended from 45 to 95 cm below the surface. The fill consisted of carbon-stained sand mixed with pebbles and 1600 microflakes. This pit lacked evidence of in situ burning, but charcoal from this pit was radio-carbon dated to 5300 \pm 110 years:3350 B.C.

Flaked Stone Artifacts

A total of 66 flaked stone artifacts were recovered from excavations at 48UT370, including 32 bifaces, two scrapers, two gravers, 22 modified flakes, four cores, three modified cobbles and pebbles, and a problematic object (Table 22). Additionally, over 2300 pieces of debitage were collected in 1983. The majority of these artifacts were found within the large charcoal-stained area south of Firepit 3 and the Special Use Pit.

Bifaces

The 32 bifaces that were recovered from this site include 11 projectile points, one hafted knife, six blanks and 14 preforms.

Projectile Points

During the 1980, 1981 and 1983 excavations at 48UT370, 11 projectile points and fragments were recovered. Five of these, including all of those recovered in 1980 and 1981, are surface finds. One projectile point each was collected from the surface of Dune A and Dune C. The remaining points were collected from the surface and from excavations on and adjacent to Dune D. Of the 11 projectile points, six are side-notched, one is corner-notched, one is stemmed, one is a finely flaked distal portion, probably from a Late Paleoindian lanceolate form, and two are fragments (Fig. 58).

Table 22. Distribution of flaked stone artifact classes by material type, 48UT370, Uinta County, Wyoming.

Artifact Class	Quartzite		Chalcedony			Chert							Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalitic	Solid Brown	Solid Other	Mottled/Speckled	Other	
Projectile Points													
Distal fragment	0	0	0	0	0	0	0	1	0	0	0	0	1
Stemmed	0	0	0	0	0	0	0	1	0	0	0	0	1
Side-notched	0	0	1	0	1	0	0	4	0	0	0	0	6
Corner-notched	0	0	0	0	1	0	0	0	0	0	0	0	1
Other fragments	0	0	0	0	1	0	0	0	0	1	0	0	2
Hafted knife	0	0	0	0	0	0	0	1	0	0	0	0	1
Blanks	0	0	3	0	0	0	0	3	0	0	0	0	6
Preforms	0	0	0	3	1	0	0	9	0	0	1	0	14
Scrapers	0	0	1	0	0	0	0	1	0	0	0	0	2
Gravers	0	0	1	0	0	0	0	1	0	0	0	0	2
Serrated flakes	0	0	1	0	0	0	0	0	0	0	0	0	1
Notched flakes	0	1	0	0	0	1	0	1	0	0	0	0	3
Other modified flakes	0	5	4	1	1	1	2	3	1	0	0	0	18
Cores	0	1	1	0	0	0	0	2	0	0	0	0	4
Modified cobbles and pebbles	0	2	0	0	0	0	0	1	0	0	0	0	3
Problematic object	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	9	12	4	5	2	2	28	1	1	1	1	66



Fig. 58. Projectile points, 48UT370, Uinta County, Wyoming. a, distal fragment Paleoindian point; b, stemmed point; c-h, side-notched points; i, corner-notched point; j, hafted knife

Distal fragment

This distal fragment, although lacking a base, is included with the projectile points because of the distinctive parallel oblique flake scars (Fig. 58a). This specimen, which is made from algalitic chert, is flaked from the upper left angling down slightly to the lower right. These small ribbonlike flake scars appear continuous from one blade edge to the other. Although this thin, delicate fragment is not diagnostic in form, this flaking pattern has been associated with many terminal Paleoindian projectile point forms (Frison 1978:34-40). This specimen was recovered from 60 cm below present ground surface of Dune D near Firepit 2.

Stemmed

This broken specimen of algalitic chert exhibits a slightly expanding stem, a notched base and square shoulders (Fig. 58b). The incomplete blade has finely retouched straight edges. Both stem sides show evidence of grinding. The flake scars on the blade are horizontal beginning at the blade edge and terminating near its center forming a slight medial ridge. The blade is 27 mm wide and 7 mm thick, and the stem at the base is 17 mm wide. Though the total length is unknown, this incomplete portion measures over 40 mm. The specimen was collected from the surface of Dune C during the 1980 testing. Similar projectile points were found at Pine Springs and described as type TB5 (Sharrock 1966).

Side-notched

Six side-notched projectile points are present in the assemblage from 48UT370 that probably represent a variety of "types". Although a number of side-notched point types are defined for the Archaic in the Great Basin and Colorado Plateau (Holmer 1978), the points from 48UT370 do not fit well into these types. Furthermore, side-notched projectile point types are not well defined for the Northwest Plains, therefore, each specimen will be described separately.

Specimen A

This nearly complete, side-notched projectile point is made of chaledony. The notches are straight sided and horizontal to the base and placed higher up the blade than the other specimens at the site. The blade is triangular and the base is straight. It is 34 mm long, 18 mm wide, 5 mm thick and 19 mm wide at the base. This artifact was found on the surface of Dune A associated with a concentration of flakes in 1980 (Bleacher 1982a). It is similar to the Sudden Side-notched points recovered at Sudden Shelter (Jennings et al. 1980) but is considerably smaller. Sudden Side-notched points date from 4400 to 2700 B.C. on the Colorado Plateau and the eastern Great Basin (Holmer 1978).

Specimen B

This small, side-notched point, which has been resharpened, is made from the locally available algalitic chert (Fig. 58d). The resharpening may have obscured the original size and shape of the blade and the configuration of the notches. The remaining blade is roughly triangular. The shape of the notches, however, is further obscured by the incomplete nature of the blade shoulders. The base is slightly convex and somewhat squarish. It is 27 mm long, 19 mm wide, 14 mm thick and the base is 20 mm wide. This point was recovered in 1983 from the surface of Dune D. It is similar to the Northern Side-notched point which is associated with occupations dating between 5000 and 4300 B.C. in areas to the south and west of the project area (Holmer 1978:67).

Specimen C

This side-notched point is made from the locally abundant moss agate (Fig. 58e). The blade has been extensively reworked into a shape that may have been used as a drill or boring tool. This reworking of the blade and damage to one end of the base has obscured the notch shape. The base is somewhat squarish and, like Specimen B, is suggestive of the Northern Side-notched type. It is 18 mm wide and 6 mm thick. This artifact was recovered from the surface west of Dune D.

Specimen D

This side-notched projectile point is made from algalitic chert (Fig. 58f). The blade is roughly triangular but resharpening has created a slightly asymmetrical appearance. The notches appear to be more deeply cut and extensively worked from opposite faces. The base is straight but has a slightly denticulated appearance. It measures 33 mm in length, 19 mm in width and 5 mm in thickness. This specimen was recovered from between 10 to 20 cm below present ground surface of Dune D. This point is similar to the Elko Side-notched type of the Great Basin.

Specimen E

This incomplete, side-notched projectile point is made from algalitic chert (Fig. 58g). The two complete notches are initiated from just above the base angling upward toward the opposite blade edge with the top of the notch nearly horizontal, resulting in comma-shaped notches. It is 20 mm wide, 5 mm thick and 19 mm wide at the base. This point is similar to the Northern Side-notched type. This point was recovered from excavations adjacent to the features at a depth of 50 to 70 cm below present ground surface at Dune D.

Specimen F

This side-notched point is made of algalitic chert (Fig. 58h). The distal portion is missing but the blade shape is either triangular or lanceolate. The base is very slightly concave and the notches interrupt an otherwise continuous edge between the base and blade. The tops of both notches are horizontal while the bottoms angle slightly up toward the opposite side. Both notches are initiated at 2.5 mm above the base. It is 20 mm wide, 5 mm thick and 18 mm wide at the base. This point does not resemble the typical Great Basin types but is similar to side-notched points from the Laddie Creek site (Frison 1978:39h). This specimen was recovered from the area adjacent to the features 71 cm below the present ground surface of Dune D.

Corner-notched

One incomplete, corner-notched point made from brown chalcedony was recovered at the site (Fig. 58i). The ends of the base, shoulder tangs and distal portions are missing. The notches appear to be initiated from the corners of the straight base. The point is 21 mm wide, 5 mm thick and at least 18 mm wide at the base. This point is similar to the Elko corner-notched points of the Great Basin, which are found throughout the Archaic and later periods. This point was recovered from just below the present ground surface of Dune D well above the stained area.

Other fragments

Two fragmentary projectile points were recovered during the 1983 excavations. Both exhibit some evidence of notching; tips and small unnotched fragments are included in the preform category. One fragment is a midsection of chert broken at the notches. The other is a small base fragment of chalcedony with the remains of one notch.

Hafted Knife

One large, side-notched artifact was recovered that appears to be a hafted knife (Fig. 58j). It is broken perpendicular to the longitudinal axis above the notches. The fracture appears along a flaw in the material, brown oolitic chert, which is commonly found 150 km to the east of the project area in the Red Desert. The notches are initiated several millimeters above the corner and they angle slightly upward from horizontal. Due to the fragmentary nature of this piece, the blade shape is indeterminate. The base, however, is slightly convex and exhibits grinding. It was recovered from the surface of Sand Dune B in 1980 (Bleacher 1982a). The knife is 36 mm wide, 7 mm thick and 35 mm wide at the base. This type of large, side-notched knife is probably associated with Early Archaic period occupations in southwest Wyoming and the surrounding intermountain area (Creasman 1983).

Blanks

Six artifacts exhibiting irregular outlines and cross section were classified as blanks and have been divided into two categories, those which have been bifacially reduced over the entire lateral margins and those that have been reduced on only a portion of the margins. Specimens in this latter group are crudely flaked and/or irregularly shaped with bifacial flaking present on between 10 and 40% of the available margins. Two of these are of moss agate and the other is of algalitic chert. Of the remaining three specimens, two are of algalitic chert and one is of moss agate. The measurements of the complete blanks range from 42 to 64 mm in length, 26 to 56 mm in width and 8 to 19 mm in thickness.

Four of the six specimens are associated with the cultural material found in areas surrounding Firepit 3 and the Special Use Pit. Another was recovered from within the fill near the top of Firepit 2. The final specimen was recovered in a 2 by 2 m excavation unit 11 m northwest of Firepit 2.

Preforms

A total of 14 preforms (Fig. 59) are included in this category consisting of two complete specimens, four distal fragments, two base fragments, three midsections and three lateral fragments. They are more regular in outline and thinner in cross section than the blanks. The two complete specimens both consist of two pieces which fit together. One of these is roughly lanceolate in outline and measures 49 by 33 by 7 mm. The other has one convex side and one recurvate side with a convex base and measures 42 by 33 by 6 mm. Both are made from locally abundant algalitic chert.

The distal fragments vary considerably in size, the largest measuring 42 mm and the smallest 13 mm. The largest is made of algalitic chert and the fracture is approximately 45° to the longitudinal axis. The other three specimens are all moss agate and all fractured approximately 90° to the longitudinal axis. One of these shows evidence of some rotary wear suggesting its use as a drill or borer.

The two basal fragments present in the assemblage vary between 22 and 36 mm in length and both are 9 mm thick. The wider is made from gray chalcedony and the smaller from algalitic chert. The larger is snapped cleanly at 90° to the longitudinal axis while the smaller shows some slight hinging and is snapped approximately 80° from the longitudinal axis.

The two midsections are of similar size, 25 to 29 mm wide and 8 to 9 mm thick, and both are made of algalitic chert. The three lateral fragments are all made of algalitic chert. The small size of these fragments renders both width and thickness measurements of little value.

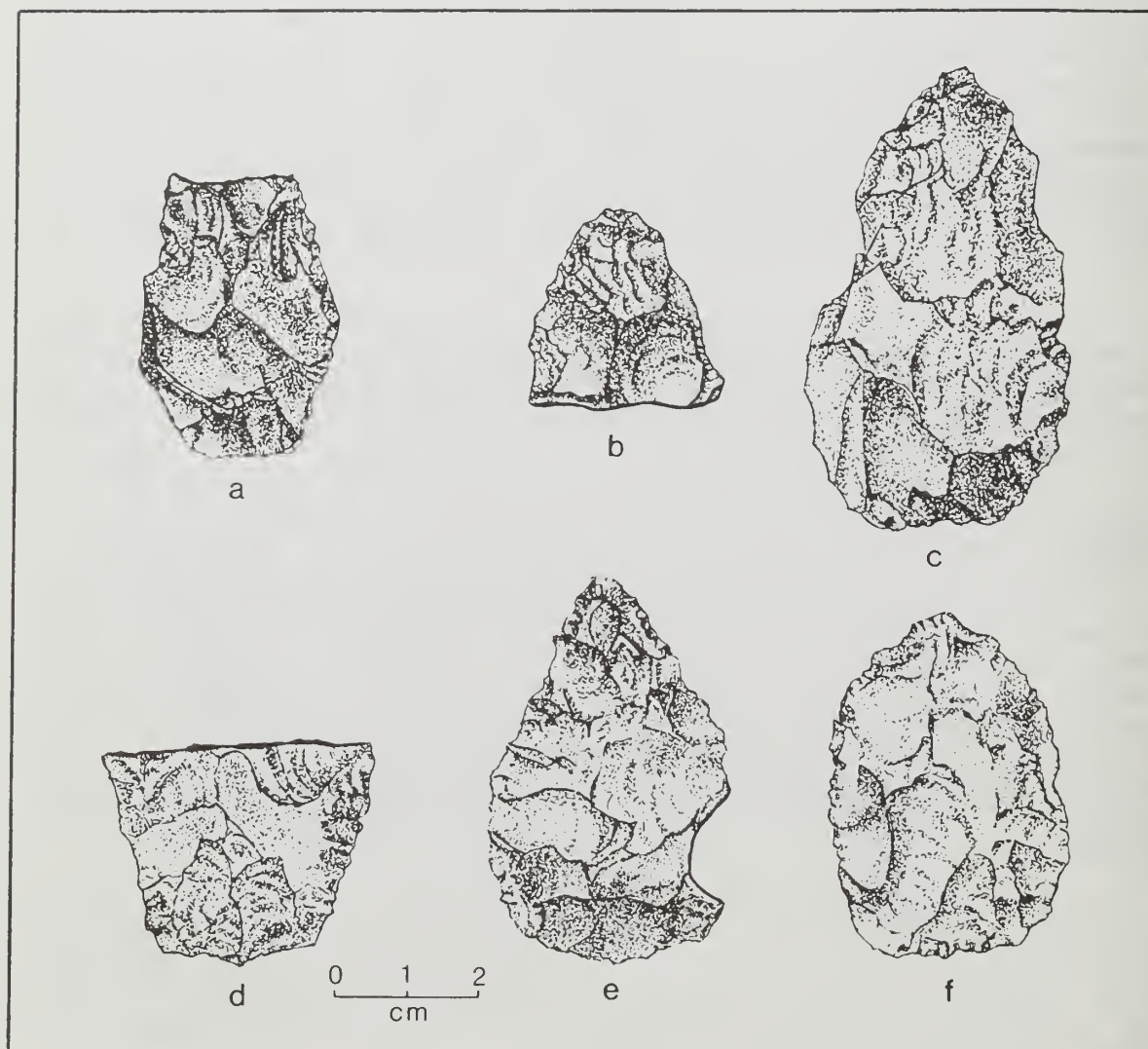


Fig. 59. Selected preforms, 48UT370, Uinta County, Wyoming.

Scrapers

Two unifacially chipped artifacts classified as scrapers were recovered at 48UT370 (Fig. 60a, b). The smaller of the two specimens measures 34 by 20 mm and is 6 mm thick. It is made from a small percussion flake of moss agate. The dorsal surface is divided by a dorsal ridge running the length of the flake with a flake scar on one side and incipient cortex on the other. The working edge is opposite the bulb of percussion. This small endscraper may also be classified as a thumbnail scraper.

The other scraper is a long, thin, bladelike flake of algalitic chert. Much of the dorsal surface retains cortex and it appears that this flake was removed from the corner of a cobble. A previous flake scar is present near the distal end and two flake scars resulting from attempts to remove the corner are present near the proximal end. Three working edges are apparent. One is present as light retouch on the distal end initiated from the dorsal surface. A second is present on the left side of the dorsal surface represented by moderate retouch initiated from the ventral surface for approximately 3 cm. Near the center of the left side of the dorsal surface, a small notch 7 mm wide is present.

The technique of manufacture of these scrapers is similar to that found at the Austin Wash Site (see Scrapers, Chapter 4). These two specimens were located within 3 m of each other in the block area adjacent to Firepit 3 and the Special Use Pit.

Gravers

Four gravers were recovered at 48UT370 (Fig. 60c-f). One notched graver is present on a moss agate core fragment and another on a quartzite blade. The other two gravers are both on moss agate flakes. One was found located in the 12 m² block excavation area 10 m north of Firepit 2. The other three were located within several meters of each other in the main activity area south of Firepit 3 and the Special Use Pit.

Modified Flakes

Serrated flake

The single serrated flake that was recovered from 48UT370 is on a decortication flake of moss agate. Serration was produced by four small notches unifacially flaked from the dorsal surface. This tool was a surface find 23 m north-northwest of Firepit 2.

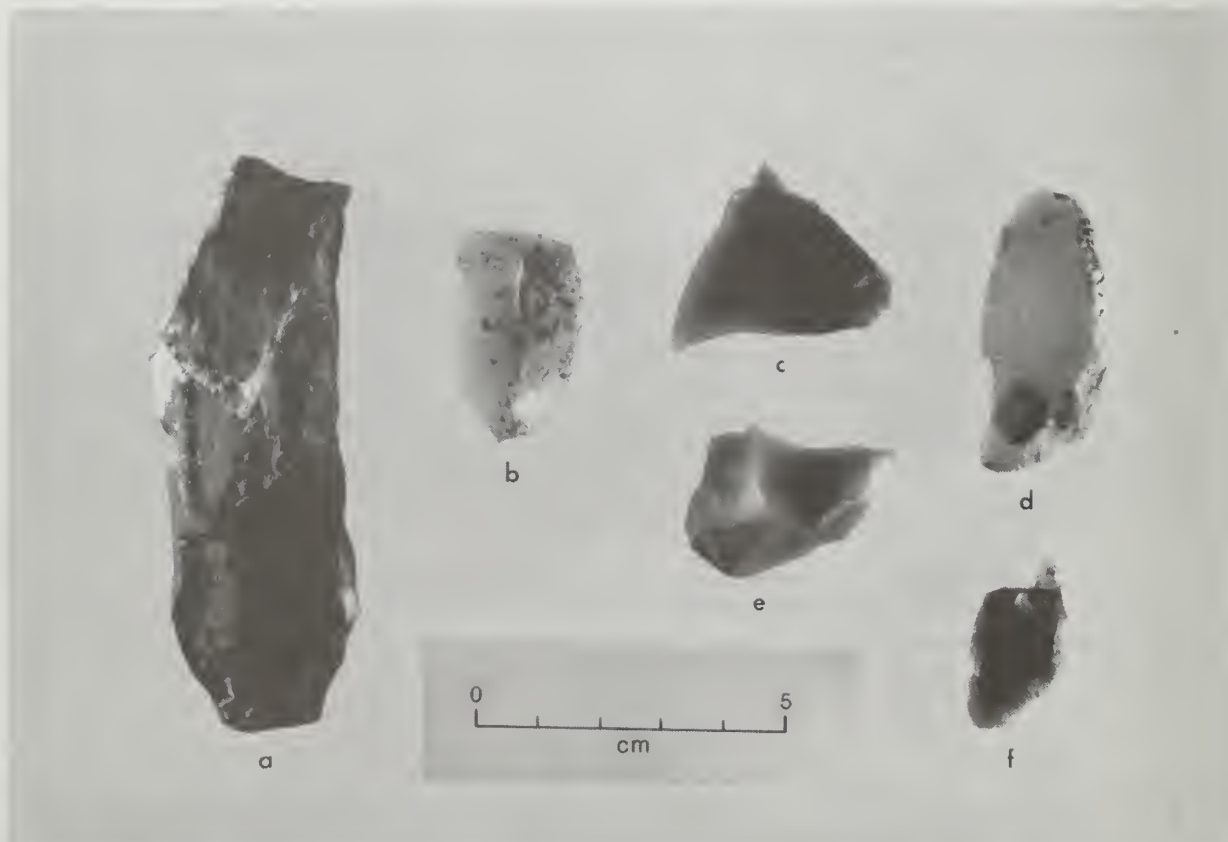


Fig. 60. Selected scrapers and graters, 48UT370, Uinta County, Wyoming.
a, b, scrapers; c-f, graters

Notched flakes

Four notched flakes were recovered at 48UT370. One includes a scraper that has already been described (see Scrapers, this chapter). All of the notches are unifacially flaked, shallow concavities ranging between 7 and 17 mm in width. Material types of the notched flakes include two of algalitic chert, one of green chert and one of quartzite. All except the green chert specimen exhibited additional retouch or use wear. One notched flake was found just north and another just to the south of the features excavated in 1981. Another was 1 m north and associated with the cultural material recovered from around Firepit 2. The final notched flake was recovered in a 2 by 2 m excavation unit 24 m north-northwest of Firepit 2.

Other Modified flakes

Eighteen flakes representing utilization or minimal preparation along an edge are included in this category. Of the 18 specimens, seven contain minor retouch and 11 have heavy edge rounding over at least one continuous centimeter. The size of these specimens varied from 19 to 76 mm long, 18 to 71 mm wide and 3 to 22 mm thick with means of 38, 31 and 8 mm, respectively. Material types represented include four of moss agate, five of quartzite, three of algalitic chert, two of banded chert and one each of green chert, brown chert, gray/white chalcedony and other chalcedony. These flakes were found in all areas of the site including two on Dune A, two near Firepit 1, one near Firepit 2, five associated with the activity area near Firepit 3 and the Special Use Pit and eight scattered through the smaller excavations in the sand-filled depression along the west side of Dune D.

Core Tools, Cores and Cobbles

Modified Cobbles and Pebbles

Two cobbles and one pebble were recovered that exhibit minimal but apparently intentional modification. Both cobbles are quartzite; one has a single, large percussion flake scar and the other has one large and two small flake scars. The pebble is of algalitic chert and has two flake scars. All three of these specimens appear to have been flaked to examine the quality of material. No utilization is apparent on any of these specimens. Both cobbles were recovered in the activity area adjacent to Firepit 3 and the Special Use Pit.

Cores

One complete core and three fragments were recovered from 48UT370. The complete core is a quartzite bifacially flaked cobble which retains some cortex on both sides. One core fragment of algalitic chert appears to be a portion of a prepared core from which several bladelike flakes have

been detached. The remaining two core fragments are relatively small and lack evidence of preparation. One is algalitic chert and the other, moss agate. The cores were scattered over the excavation area, including the activity area south and east of Firepit 3 and the Special Use Pit, the area around Firepit 1 and the sandy area adjacent to Dune D.

Problematic Object

A large object made from a slab of chalky green chert was recovered in the activity area adjacent to Firepit 3 and the Special Use Pit. It measures 320 by 115 mm and is 31 mm thick and contains five unifacial flakes along wide notches on one edge. The object also exhibits some unifacial use wear along one edge. The function of this artifact is unclear.

Debitage

Table 23 presents 2360 pieces ofdebitage sorted by raw material and reduction stage. At this site, algalitic chert makes up less than half (45.5%) of the collection followed by moss agate (33.9%). The percentage of finished tools of each of these materials is somewhat lower (Table 23). All stages of manufacture are represented in the groups with larger sample sizes. There is contrast between proportions for the moss agate and the algalitic chert. The former shows greater relative frequencies of early stage flakes, decortication (13.6%) and initial reduction (23.3%). The latter has only 3.7% decortication flakes and the largest category is primary thinning (15.7%). While cores are rare at the site, it appears that the moss agate material was more important for the early stages of lithic reduction than the algalitic chert. Moss agate has very few flakes (12.5%) larger than the medium-small size despite the strong representation of decortication and initial reduction flakes suggesting small pieces of primary material. The most common sizes overall are medium-small (58.4%) and small (30.3%). The same tendency for greater frequency of smaller flakes occurs in both major raw material types (Table 24).

Faunal Analysis

Only a limited amount of faunal remains were recovered during the excavation. The total collection includes 95 whole and fragmentary bones and one bird egg shell fragment (Table 25). In addition to modern horse, represented by a surface find of a distal end of a radius, seven other taxa could be identified--antelope, jackrabbit, cottontail, ground squirrel, prairie dog, pocket gopher and chipmunk.

With the exception of the pocket gopher, which in many cases may be intrusive, most of the identified taxa may be represented by only one or two individuals (MNI). The most common specimens are indeterminate long bone fragments (22) from large mammals. Evidence of burning is only found on five of the specimens in this category. None of the other specimens

Table 23. Frequency of debitage by reduction stage and material type,
48UT370, Uinta County, Wyoming.

Reduction Stage	Quartzite			Chalcedony			Chert					Total	
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algaittic	Solid Brown	Solid Other	Mottled/Speckled		Other
Decortication	0	21	109	12	11	0	0	40	0	0	11	0	204
Initial reduction	0	59	186	10	8	4	0	126	0	5	7	0	405
Primary thinning	2	11	113	15	8	2	0	170	0	9	3	0	333
Secondary thinning	1	7	107	17	25	1	0	134	0	5	4	0	301
Final shaping	0	5	83	20	21	0	0	113	0	0	3	0	245
Indeterminate	1	56	171	32	19	7	0	363	0	10	15	0	674
Other	0	0	0	0	0	0	0	1	0	0	0	0	1
Total flakes	4	159	769	106	92	14	0	947	0	29	43	0	2163
Shatter/chunks	0	26	31	4	1	1	0	127	0	1	6	0	197
Total debitage	4	185	800	110	93	15	0	1074	0	30	49	0	2360

Table 24. Frequency of debitage by size and material type,
48UT370, Uinta County, Wyoming.

Size	Quartzite			Chalcedony			Chert					Other	Total
	Purple	Other	Moss Agate	White/Gray	Other	Granger Green	Banded	Algalttic	Solid Brown	Solid Other	Mottled/Speckled		
Large	0	4	1	0	0	0	0	2	0	0	1	0	8
Medium-large	0	12	13	0	0	0	0	12	0	2	1	0	40
Medium	0	26	86	5	4	2	0	91	0	2	2	0	218
Medium-small	4	98	481	57	62	9	0	618	0	19	31	0	1379
Small	0	45	219	48	27	4	0	351	0	7	14	0	715
Total	4	185	800	110	93	15	0	1074	0	30	49	0	2360

Table 25. Faunal remains from 48UT370, Uinta County, Wyoming.

Taxa	NISP	MNI
Horse (cf. <u>Equus caballus</u>)	1	1
Antelope (<u>Antilocapra americana</u>)	5	1
Large mammal	26	--
Jackrabbit (<u>Lepus townsendii</u>)	6	1
Medium mammal	5	--
Cottontail (<u>Sylvilagus</u> sp.)	4	1
Ground squirrel (<u>Spermophilus</u> spp.)	10	2
Prairie dog (<u>Cynomys leucurus</u>)	10	2
Pocket gopher (<u>Thomomys talpoides</u>)	10	5
Chipmunk (<u>Eutamias</u> sp.)	2	1
Small mammal	14	--
Bird egg shell	1	--
Unidentifiable	1	--
Total	95	14

NOTE: NISP = Number of Identified Specimens per Taxon; MNI = Minimum Number of Individuals.

were burned. Cut marks were present on three of the five antelope bones. Surprisingly, the collection is not highly weathered. The majority of the specimens fall into stage 2 or 3 weathering.

The limited faunal remains from the site shed little light on the animal procurement strategies or season of occupation at the site. Only the large mammal bones show evidence of human modification, i.e., burning or cut marks. The remainder of the collection probably represents both human utilization and postoccupation intrusions.

Plant Macrofossil Analysis

The fill from Firepit 2 and the Ash Dump were processed and examined for charred plant macrofossils; however, neither feature contained seeds.

Summary and Conclusion

48UT370 comprises four sand dunes, A, B, C and D, and the interdunal area. Excavations on Dunes A and B yielded little cultural material. A backhoe trench through Dune A failed to expose any indications of buried deposits. A backhoe trench through Dune B did expose two very faint gray stains but these stains were not noted in hand excavations for magnetic anomalies on Dune B. Dune C exhibited no cultural material and previous investigations probably recovered most of the artifactual material. No artifactual material or cultural features were exposed by blading operations during construction of the right-of-way.

Backhoe testing in the flat, sandy area west of Dune D exposed a firepit 1 m below the ground surface. An area of 10 m² was excavated around the feature but no diagnostic material was recovered. However, soil from the feature provided a radiocarbon date of 4290 \pm 150 years:2340 B.C.

The only significant results from the excavations were from areas northeast and southeast of the feature complex discovered in 1981 (Miller 1982). To the south and east of these excavations, the charcoal-stained soil continued for up to 5 m. Artifacts were scattered throughout this stain but abruptly stopped outside the stain. This was generally true for debitage density as well.

The bulk of the material recovered at 48UT370 was along the western flank and the sandy area to the west of Dune D. During the 1981 investigations, two features within approximately 2 m of each other were recorded along with associated charcoal staining, debitage, thermally altered rock, tools and some bone. A radiocarbon date of about 3300 B.C. was obtained from one of the features. Thirty-six m² were placed to the south and east and north and east of the 1981 feature complex. Results of these investigations exposed a large charcoal-stained area with numerous chipped stone tools. In this area two more features were discovered, a firepit and an ash dump approximately 3 m away from the original feature complex. The firepit was radiocarbon dated to about 4500 B.C.

In the charcoal-stained area to the south and southeast of the original feature complex, a great many tools were recovered. Units dug outside of the stain produced few or no tools and little or no debitage. This

entire activity area was not excavated. A good portion of the activity area may still exist to the west of the 1983 excavations and to the east along the western dune slope of the original feature complex.

Several units were excavated in the sandy filled area to the west of Dune D. Although widely scattered, every unit produced at least some cultural material. This would indicate that there is a great possibility of other activity areas being present in the sandy filled depression to the west of Dune D.

Two radiocarbon dates of 4530 and 3350 B.C. clearly place the occupation excavated at Dune D in the Early Archaic period. While there is a great degree of variability in the projectile points recovered in this area, all are side-notched points which are generally considered diagnostic of the Early Archaic. The lack of ground stone and plant macrofossils implies that the site was something other than a plant processing site. The limited amount of faunal remains and the variation in debitage suggest that this area of the site represents an Early Archaic temporary field or hunting camp.

Chapter 8

48UT445

Introduction

48UT445 is an example of one of the numerous small, limited activity dune sites found throughout the Green River Basin. The site, which dates to the Late Prehistoric period, produced a shallow firepit, a preform tip, a modified cobble and pebble, a hammerstone and 1285 pieces of debitage.

Previous Investigations

48UT445 was first recorded as a "surface scatter of about 30 flakes, a quartzite cobble chopper and a core" in September, 1980, and later tested during the reinventory of the MAPCO Pipeline (Bryant 1982:425; Metcalf and Anderson 1982a:50). The site was reinventoried in the summer of 1982 during a Class III inventory of the Frontier Pipeline which parallels the MAPCO Pipeline in this area. Lithic debitage and thermally altered rock were noted eroding out of the western flank of a sand dune in the Frontier Pipeline right-of-way.

Field Methods

A block area of 44 m² was excavated on the south side of the sand dune where cultural material was observed on the surface (Fig. 61). Additionally, three 1 by 1 m units were dug over magnetic anomalies located during the magnetometer survey. These excavations were conducted following the procedures outlined in Chapter 3.

Site Setting

48UT445 is located on the southeast edge of an extensive sand dune field about 7.5 km east-northeast of Church Butte on the west side of Triangulation Point Draw. This dune field, which was formed by the erosion of the sandstone and other fluvial deposits of the Eocene Bridger Formation, lies at a mean elevation of 1935 m. The Blacks Fork River, the only permanent water in the area, is located 5.2 km north of the site area. Seasonal water is available in the drainages and interdunal ponds located around the site area.

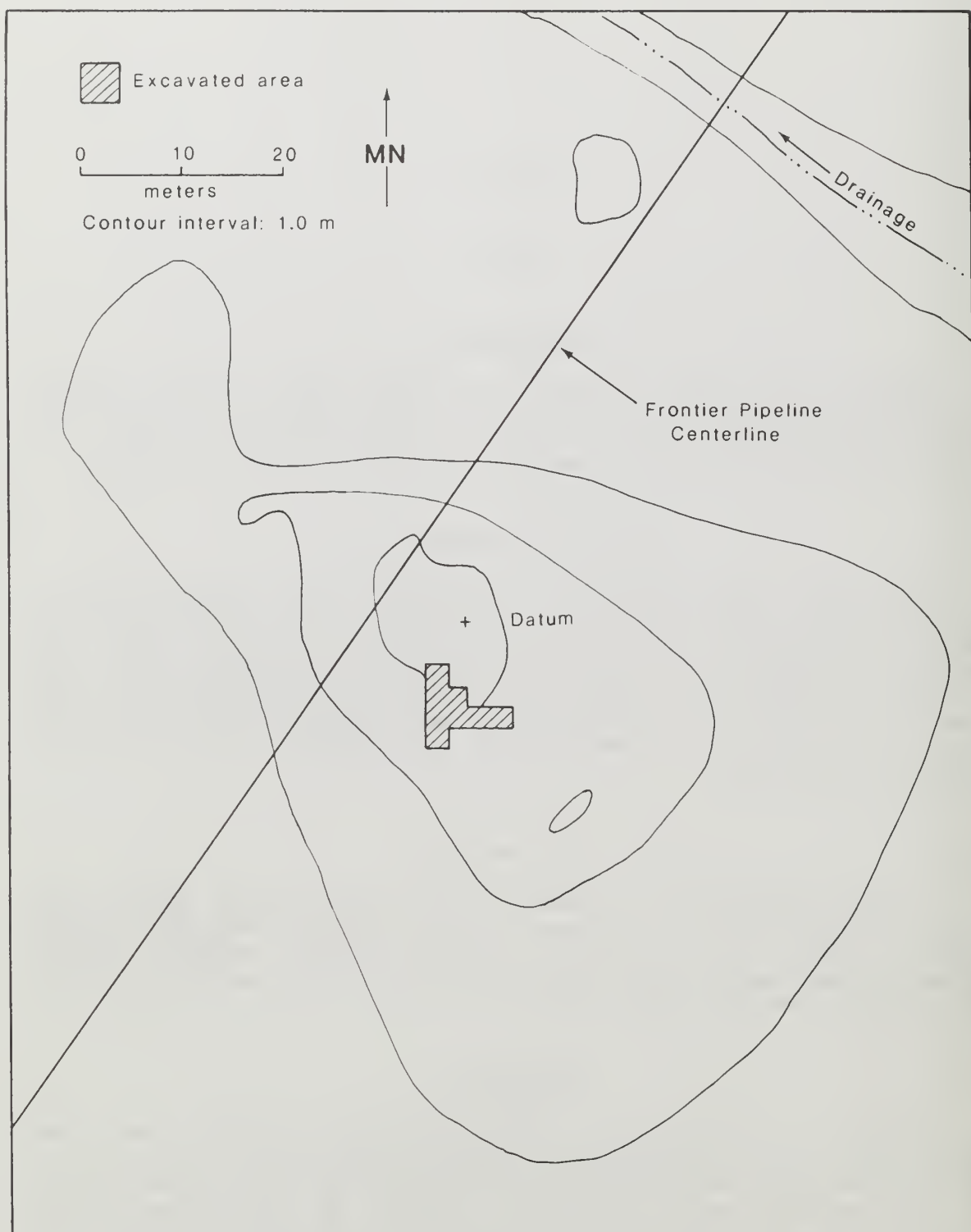


Fig. 61. Plan map of site area, 48UT445, Uinta County, Wyoming.

The site is situated on the southwest end of a long, east/west trending dune. The surface of the dune contains a light scatter of lithic debitage consisting of algalitic chert, various other cherts and quartzite flakes, and thermally altered rock. Vegetation noted around the site area includes big sagebrush, saltbush, Indian rice grass, sand dock, biscuit-root, rabbitbrush, snakeweed and various small forbs.

Stratigraphy

The deposits of the sand dune, in which 48UT445 is located, consist of a fairly compacted eolian sand that is similar in texture, composition and angularity to the other dunes in the area (Oviatt 1983). Little natural stratigraphy could be discerned within the excavated portion of the dune. The upper 5 cm was composed of a loose, tan, blow sand. Some cross-bedding interspersed with pockets of silts and clays was evident in the portion below the loose sand. Calcium carbonate is present throughout the dune but increases with the depth of the deposits. Excavations were terminated at a hard cemented calcium carbonate layer. The entire excavation area was extensively mixed due to rodent disturbance. Ash, charcoal and debitage were common about 40 to 50 cm below the present dune surface. The cultural material probably belongs to one brief period of occupation that occurred on an old dune surface.

Firepit

Excavations at 48UT445 uncovered only one feature, a firepit consisting of a roughly circular, shallow depression filled with charcoal flecks. It measured 50 by 60 cm and was 10 cm deep. No oxidation or fire reddening was evident within the pit which was located about 35 cm below the present surface of the dune. Debitage and some thermally altered rocks were associated with this feature. Charcoal collected from within the firepit yielded a radiocarbon age of 930 ± 60 years:A.D. 1020 (Beta 7338).

Another radiocarbon date of 1200 ± 90 years:A.D. 750 (Beta 7337) was obtained from scattered charcoal flecks recovered in an excavation unit to the north and up the dunal slope from the firepit. These flecks were recovered from an area containing patches of charcoal and ash associated with chipping debitage occurring between 40 to 50 cm below the present dune surface. Because this date was obtained from scattered flecks in disturbed deposits, the date may not be accurate.

Flaked Stone Artifacts

Excavation produced only one large preform tip, a modified cobble and pebble, and 1285 pieces of debitage. The bulk of the material was associated with the firepit, the mottled ash and charcoal areas, and the thermally altered rock that occurred about 40 cm below the present dune surface.

Preform

One preform of algalitic chert was the only biface recovered during excavations at 48UT445 (Fig. 62). This specimen is a tip fragment measuring 51 mm in length, 45 mm in width at the widest spot and 8 mm in thickness. It was associated with the other cultural material in the dune and was found within 60 cm of the firepit.

Modified Cobbles and Pebbles

Two specimens that exhibit minimal modification were also found during excavations. One is a pebble of quartzite with a bifacially worked edge displaying only a few flake scars. The other artifact is a cobble of purple quartzite that is longitudinally split without other modifications. The cobble was probably split to examine the quality of the material. Both specimens are of materials that are common in the desert pavement near the site.

Debitage

A total of 1285 pieces of chipping debitage was recovered during the excavations. Of these, 1120 pieces or 87% are of algalitic chert; the remaining 13% are distributed among other cherts, chalcedonies and quartzites of various colors. These material types are all available in the desert pavement near the site. Secondary thinning flakes represented 91% of the debitage. The remaining 116 flakes represented all other flake categories of reduction.

Hammerstone

One hammerstone of Granger Green chert was recovered during the excavations. It is roughly a cube measuring 55 by 40 by 45 mm. Most corners have been extensively battered.

Faunal Analysis

Excavations at 48UT445 produced 284 fragmentary or whole bones. These include 208 of rodent, 14 of rabbit (MNI=1), one of bird, 23 of an unidentified small mammal of rodent size, 35 of an unidentified medium mammal of rabbit size and three small unidentifiable fragments. The only burned bone consisted of 20 unidentified small mammal fragments. Because the site was extensively disturbed by rodents, most of the recovered unburned bone probably entered the deposits as a result of recent intrusions. The one bird bone fragment was extremely weathered, probably from lying on the surface before being mixed into the deposits.

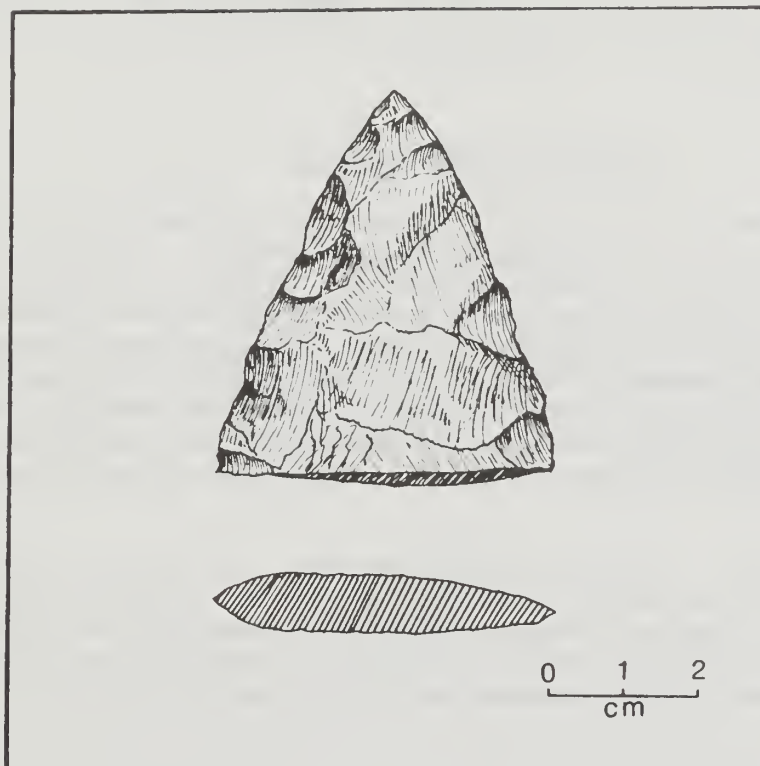


Fig. 62. Biface fragment, 48UT445, Uinta County, Wyoming.

Plant Macrofossil Analysis

A total of 35 charred seeds were recovered from the fill of the firepit. These seeds include 24 goosefoot (Chenopodium sp.), nine willow (Salix sp.), one peppergrass (Lepidium sp.) and one Indian rice grass (Oryzopsis hymenoides).

Summary and Conclusions

48UT445 is a small sand dune site containing the remains of a single, brief occupation dating to the Late Prehistoric period. The 1983 excavations uncovered only one feature, a roughly circular, shallow firepit dating to about A.D. 1070. Flotation analysis of the feature fill produced a few charred seeds of goosefoot, willow, peppergrass and Indian rice grass. Additional concentrations of ash and charcoal occurred in the dunes. Recovered cultural material includes a large preform tip, a modified cobble and pebble, a hammerstone and 1285 pieces of chipping debitage. The debitage, of which 87% is of algalitic chert, are primarily secondary thinning flakes.

This site, then, is a small, limited activity area and appears to have served as a chipping station for locally available algalitic chert and quartzite cobbles. Because 48UT445 includes the remains of only one brief occupation on the side of a dune, it is an excellent example of limited activity sites occurring at numerous small dunes scattered throughout the Green River Basin.

Chapter 9

48UT377

Introduction

48UT377 is a large, dispersed lithic scatter situated on several sand dunes and surrounding clay hardpan of an upper terrace above the Blacks Fork River. The 1983 excavations at the site produced only a bifacially modified fragment of chert and 19 pieces of debitage. No features or intact subsurface cultural deposits were encountered. Earlier investigations yielded a Late Prehistoric projectile point and 16 flakes.

Previous Investigations

48UT377 was originally recorded within the right-of-way of the MAPCO Pipeline in 1980 (Collins and Jennings 1980), and later mapped, collected and tested. One Rose Spring projectile point, three cores and 16 pieces of debitage were collected from the surface during these investigations; no subsurface cultural deposits were identified (Lewis 1982). In June, 1982, 48UT377 was relocated and recorded within the proposed Frontier Pipeline right-of-way.

Field Methods

Archeological excavations were conducted at the three dunes within the pipeline right-of-way (Fig. 63). Twelve 1 by 1 m test units were excavated to identify and locate subsurface cultural deposits. Additional 1 by 1 m test units were dug over each of the five magnetic anomalies identified during the magnetometer survey, but no cultural features were discovered. A total of 17 m² was excavated following the general procedures outlined in Chapter 3.

Site Setting

48UT377 is near the northwest edge of a large sand dune field located on an upper terrace of the Blacks Fork River about 8 km southwest of Granger, Wyoming. The site encompasses three low sand dunes and the surrounding clay hardpan on the east side of Triangulation Point Draw. The

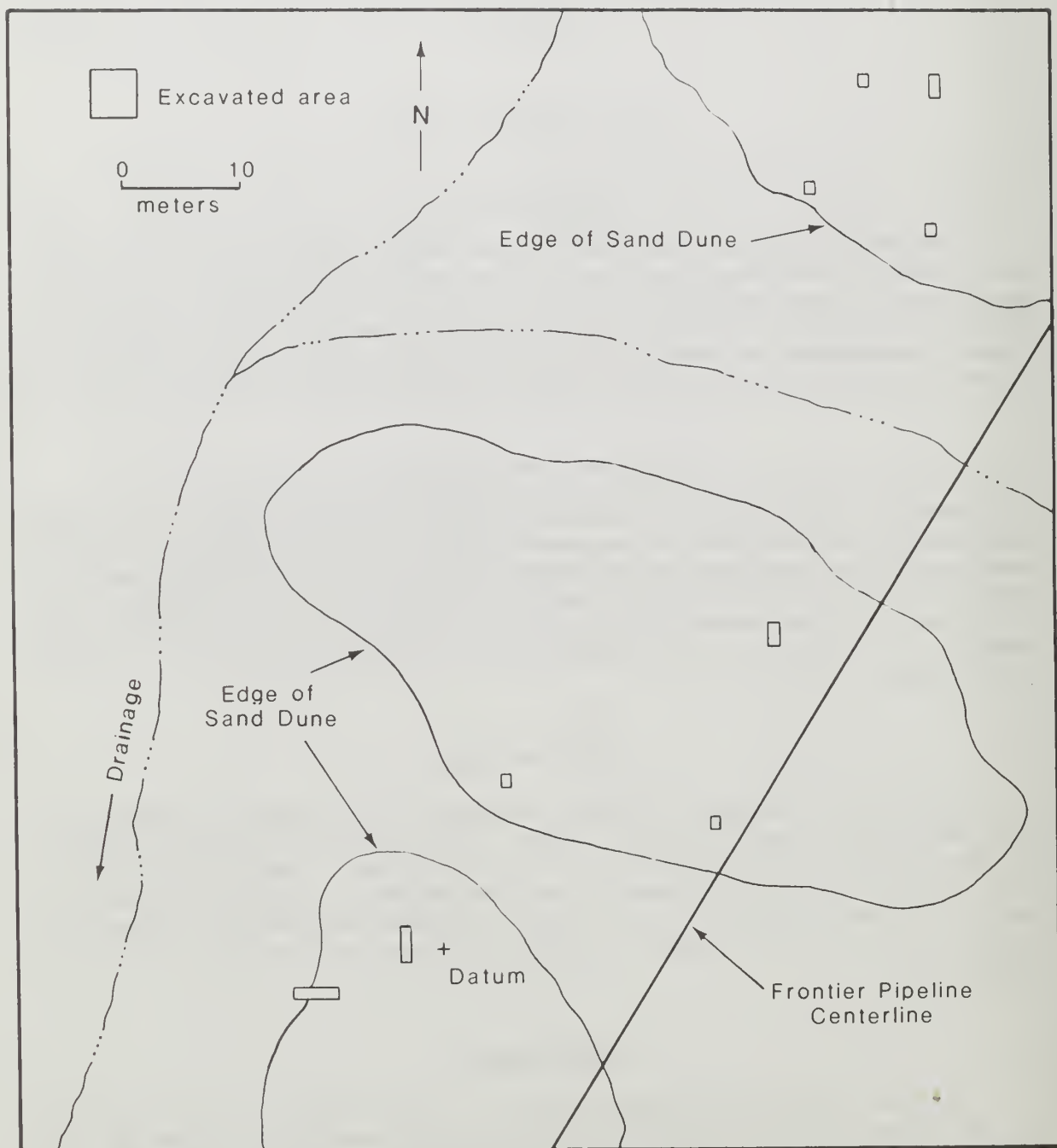


Fig. 63. Plan map of site area, 48UT377, Uinta County, Wyoming.

site is defined by debitage and thermally altered rock scattered over the surface of the clay hardpan. No cultural material was observed on the sand dune surfaces.

Vegetation on the site is dominated by sagebrush, greasewood and saltbush. Rabbitbrush, shadscale, spiny hopsage, snakeweed, buckwheat, desert parsley, biscuitroot, wild onion, prickly pear cactus, Indian rice grass, needle-and-thread grass and wheat grass are common understory plants. Russian thistle covers disturbed areas. Water is seasonally available in Triangulation Point Draw, an intermittent drainage 100 m west of the site; the Blacks Fork River, 4.8 km to the north, provides the nearest permanent water.

Stratigraphy

The dunes at 48UT377 are composed of massive, relatively well sorted and angular eolian sand without discernible stratigraphy (Oviatt 1983). Calcium carbonate occurs throughout the dunes but becomes harder and more cemented with depth. No distinguishable layers of charcoal and ash or other cultural material were observed in the excavation pits.

Flaked Stone Artifacts

As with the earlier investigations at the site, the 1983 excavations failed to produce cultural features. Only one bifacially modified fragment of angular chert and 19 pieces of debitage were recovered in six of the 17 1 by 1 m excavation units. The other units were sterile. Most artifacts were recovered from the interface between the sand and clay hardpan.

Modified Cobble

The only flaked stone tool recovered during the 1983 excavations is a bifacially modified angular slab of algalitic chert. One edge was crudely flaked forming an irregular outline and an acute edge angle. The specimen is 80 mm long, 60 mm wide and 12 mm thick.

Debitage

A total of 19 pieces of debitage was encountered in the 1983 excavation units. There are 13 secondary thinning flakes and three small pieces of shatter of algalitic chert. Three decortication flakes from a small cobble of purple quartzite were found in one unit. Both material types occur naturally among the desert pavement on the clay hardpan within the site area.

Summary and Conclusions

48UT377 is a small, limited activity site probably dating to the Late Prehistoric period. It consists of a naturally disturbed, dispersed lithic scatter located on several sand dunes and surrounding clay hardpan. All investigations at the site have produced only two flaked stone tools, a Rose Spring projectile point and a bifacially modified fragment of chert. In addition, only 35 pieces of debitage have been collected. Cultural features have never been recorded on the site, although thermally altered rock is dispersely scattered over the surface of the clay hardpan. These investigations indicate that the site lacks significant, intact subsurface cultural deposits and has limited interpretive potential.

CHAPTER 10

PROJECT CONTRIBUTIONS TO RESEARCH THEMES

In Chapter 1, a series of six research themes, Cultural Chronology, Subsistence Patterns, Settlement Patterns, Intrasite Patterning, Technological Analyses and Methodology, were presented as research domains that might be addressed by results of this data recovery program. Our success in addressing these research topics varied. We will present our results for each research theme individually.

Cultural Chronology

One of the goals of this data recovery program was to provide data that would help refine a local chronology for southwestern Wyoming. We had hoped that several of the sites on this project would provide a series of superimposed stratigraphic occupations that could be used to aid in constructing this chronology. Unfortunately, the sites were poorly stratified and our sample of prehistoric components was biased towards the Late Prehistoric period. Table 26 presents the radiocarbon dates obtained in 1983 while Fig. 64 displays the range of all the radiocarbon dates, including those from previous test excavations, at the excavated sites. The bulk of the dates fall into the Late Prehistoric period, with several scattered dates from the Archaic. And although several Paleoindian points were recovered from these sites, no in situ paleoindian occupations were identified.

Because a complete chronological sequence could not be derived from this data recovery program, we complemented our results with a review of existing data. Our goal was to identify diagnostic classes of artifacts and features that could be used as chronological markers. Although several distinctive classes of artifacts were identified for the Late Prehistoric period (see Technological Analyses below), only projectile points appear to have chronological significance across all prehistoric periods, given our current understanding of the prehistory of southwestern Wyoming.

Unfortunately, with the exception of the Rose Spring points from the Austin Wash Site and a variety of side-notched points from 48UT370, the sample of projectile points from the sites was too small for statistical comparative purposes. However, attempts to identify comparable named types demonstrated that there is some confusion about the distribution of both Plains and Great Basin point types in southwestern Wyoming.

Table 26. Radiocarbon dates from the 1983 excavations.

Site Number	Date
Austin Wash Site (48UT390)	1070 \pm 80 B.P. (Beta 7274) 1160 \pm 50 B.P. (Beta 7273) 1250 \pm 60 B.P. (Beta 7272) 1370 \pm 60 B.P. (Beta 7271)
48UT199	1260 \pm 70 B.P. (Beta 7269) 1460 \pm 90 B.P. (Beta 7277) 4890 \pm 240 B.P. (Beta 7276)
48UT779	1130 \pm 80 B.P. (Beta 7275) 4670 \pm 120 B.P. (Beta 6945)
48UT370	4290 \pm 150 B.P. (Beta 7278) 6480 \pm 340 B.P. (Beta 7270)
48UT445	930 \pm 60 B.P. (Beta 7338) 1200 \pm 90 B.P. (Beta 7337)

It appears that several point types that occur throughout the Great Basin, the intermountain area and the Northwest Plains have been given different names on the Northwest Plains and the Great Basin. For example, several side-notched point styles from Altithermal components have been variously referred to as Mummy Cave Side-notched or Pahaska Side-notched on the Northwest Plains. Morphologically similar points dating from the same time period are referred to as Northern Side-notched points in the Great Basin and Colorado Plateau. A similar situation exists with the San Rafael Side-notched point from the Colorado Plateau and the Mallory point from the Northwestern Plains.

The Mallory and San Rafael Side-notched are morphologically similar types with generally triangular blades and horizontal side notches about one-third of the way up the blade. Mallory points often have a basal notch, but an illustrated San Rafael specimen (Holmer 1978:53) also exhibits a basal notch. Both types are reported as being very thin (Frison 1978:50; Holmer 1978:53). Frison (1978) reports a span of 2500 to 2100 B.C. on the Plains for Mallory points where they have been found in association with McKean lanceolate forms. At Sudden Shelter, San Rafael points date from 2600 to 2100 B.C. and continue to about 1700 B.C. elsewhere on the Colorado Plateau (Holmer 1978:69). The distinctive nature of these points and the coincidence of their time spans suggest that these two named types represent a single point type.

The existence of different named types with similar morphologies and chronological spans from the Plains and the Great Basin hampers identification of cultural affiliation of sites in the Wyoming Basin, which is often considered transitional between the two areas. This situation casts some doubt on the reliability of dating a site or evaluating cultural affiliations solely on the presence of projectile points. Wherever possible, complete artifact assemblages, not just projectile points, should be used to evaluate cultural affiliation and chronological placement.

To shed further light on the cultural chronology of southwestern Wyoming, we conducted an analysis of over 300 cultural features from excavated and tested sites throughout the region to determine if cultural features could be used as temporal markers. Of the seven analyzed feature types, pits, postholes, rock-filled firepits, hearths, stains and thermally altered rock concentrations, only slab-lined firepits seem to be chronologically distinctive, as discussed below. The remaining types are found throughout all prehistoric periods, although the data suggest that the frequency of hearths and rock-filled firepits increases in the Late Archaic and Late Prehistoric periods, and that large stains are most common in the Middle Archaic. These results must be interpreted with caution because unburned pits, of all shapes and sizes, represent more than 60% of the sample of cultural features and are found in all prehistoric periods.

While these individual features do not seem to have any temporal significance, a particular arrangement of three pits, referred to as a "tri-hearth complex" (cf. Brown 1978a), does appear to be diagnostic of the early part of the Late Prehistoric in southwestern Wyoming. This feature arrangement is one of the few for which a functional interpretation has been advanced. The known examples of tri-hearth complexes are presented and discussed below.

Slab-lined Firepits

Slab-lined hearths have been radiocarbon dated at numerous sites in the Wyoming Basin, the Great Basin and the Colorado Plateau. Radiocarbon dates assigned to these hearths range from around 3560 to 1750 B.C. Both of these dates were recorded at the Maxon Ranch site (48SW2590). Other dates from southwest Wyoming for slab-lined firepits are 1810 B.C. from the Paradox Ridge site (48SW4381), 2320 B.C. from 48CR3610, 2290 B.C. from 48CR3962 and 2670 B.C. from 48UT779, excavated during this project. In central Utah 18 slab-lined hearths were excavated at Sudden Shelter dating from about 3000 to 2400 B.C. (Jennings et al. 1980).

Discussion

Slab-lined hearths vary widely in size, shape and the amount and type of material used for the construction. Additionally, very little data concerning the specific function of these hearths is available. Pollen samples and flotation samples taken from open camp sites have not produced

any significant results. Only at Sudden Shelter in central Utah has flotation analysis produced carbonized plant remains from the slab-lined hearths (Jennings et al. 1980).

Although slab-lined firepits appear to span the Early Archaic/Middle Archaic boundary, they are apparently temporally diagnostic for the period from about 3600 to about 1700 B.C. They are not abundant at any site and their function is uncertain. With the exception of those from Sudden Shelter, most of the slab-lined pits have failed to yield extensive evidence of plant processing. The association of carbonized plant remains at Sudden Shelter with features does not automatically imply that they were used for plant processing. Rather, at the time of use of the slab-lined firepits at the site, the complete artifact assemblages seems to indicate that the occupants increased their use of wild plant resources relative to the preceding and following periods (Jennings et al. 1980).

Tri-hearth Complex

In southwest Wyoming, several excavated or tested sites in the Red Desert, Rock Springs Uplift and Green River Basin exhibit a distinctive triangular configuration of three associated subsurface pits. Configurations of these types have been designated by Brown (1978a) as "tri-hearths." The following is a brief discussion of the specific configuration of these complexes at various sites. They appear to be diagnostic feature complexes of the early part of the Late Prehistoric period.

One manifestation of the tri-hearth complex was excavated at 48UT199 during this project. These features were found under an amorphous, diffuse gray stain which included a dense scatter of thermally altered cobbles, tools, debitage, unaltered cobbles, burned and unburned bone. The three pits were situated in a triangular configuration, with the central pit, the Roasting Pit, measuring 80 by 70 cm and 50 cm deep. The pit had nearly vertical walls with a rounded bottom and contained a very dark matrix with little charcoal. Small amounts of burned and unburned bone were present in the fill along with some thermally altered rock and several small flakes. A smaller basin-shaped Rock-filled Firepit was located 50 cm northwest of the Roasting Pit. The firepit measured 48 by 40 cm and was 21 cm deep. The matrix was very dark, containing bone and thermally altered cobbles. Burned and unburned bone were present as was charcoal. This feature yielded a date of 1460 ± 90 years:A.D. 490 (Beta 7277).

The third pit was a small, conical trash pit measuring 29 by 24 cm and 18 cm deep. The matrix of this pit was extremely dark sand full of thermally altered rock, bone fragments, flakes and some charcoal. This pit was located approximately 70 cm southwest of the Roasting Pit. Approximately 1 m south of the trash pit was a pile of 10 to 15 cobbles that showed no evidence of thermal alteration and were interpreted as unused roasting stones.

There is another tri-hearth complex at the Paradox Ridge site (Gardner, Harvey et al. 1982) in the Rock Springs Uplift near the Jim Bridger Power Plant. This triangular configuration of three pits was excavated in Component 2. Feature D12 is 70 by 46 cm and is approximately 22 cm deep. Feature D13 is 60 by 65 cm and approximately 15 cm deep. Feature D14 is 30 by 44 cm and 10 cm deep. Feature D12 was radiocarbon dated to 1390 ± 60 years:A.D. 560 ([Beta 5165] Gardner, Harvey et al. 1982). As was the case at 48UT199, these features were located under an amorphous stain associated with thermally altered rock, bone, flakes and tools.

At the Lost Quarry site in the Red Desert excavated by Metcalf (see Brown 1978a), an excavated tri-hearth complex produced two radiocarbon dates; 1115 ± 50 years:A.D. 835 (UGA 2052) and 1415 ± 70 years:A.D. 535 (UGA 1053). Unfortunately, no dimensions are available due to the nature of the salvage operations.

Also in the Red Desert, a tri-hearth complex was excavated at 48SW1873 (Reust et al. 1982). Feature 2 was a basin-shaped, circular firepit measuring 65 by 62 cm and 40 cm deep. The walls of the pit were oxidized and the dark gray stained sand held a large amount of charcoal. Two layers of rock lined the bottom of the pit separated by a thin layer of sand. Additional rocks were noted near the surface of the feature. A radiocarbon sample yielded a date of 1345 ± 95 years:A.D. 605 (UGA 3774). Feature 3 measured 45 by 45 cm and was 60 cm deep. The cross section revealed that the pit was bell-shaped with excurvate walls and a flat bottom. At approximately 25 cm below the top of the feature was a double layer of thermally altered rock extending to about 32 cm below the top of the feature. Eight burned, small mammal bones and two microbladeliike flakes were recovered from the fill. A radiocarbon date of 1110 ± 75 years:A.D. 840 (UGA 3787) was obtained from a charcoal sample.

Feature 4 at 48SW1873 measured 55 cm in diameter with a depth of 40 cm. The pit had straight walls and a rounded bottom. The pit walls exhibited oxidation. A layer of rock was present between 10 and 20 cm below the top but only on the east half of the feature. Approximately 5 cm below this rock layer was another 10 cm thick layer of rock. Between the two layers of rock was very dark charcoal laden sand. Below the lower layer of rock was an extremely heavy charcoal concentration. Only a single, burned, small mammal bone fragment was recovered from this feature.

An undated tri-hearth complex was excavated at 48LN74 on the Opal Bench in the Green River Basin (Brown 1978b). This site is in a large sand dune and has evidence of Early Archaic through Late Prehistoric occupations. However, due to ambiguous stratigraphy within the sand dune and lack of temporally diagnostic artifacts directly associated with the tri-hearth, no chronological association was assigned.

Discussion

All of these tri-hearth complexes are similar in that there is generally one roasting pit, one cobble-heating pit and one additional pit of uncertain function situated in a triangular configuration. Additionally, all of the tri-hearth complexes have two common characteristics, thermally altered rocks and bone, and most include an overlying amorphous gray stain which includes thermally altered cobbles, burned and unburned bone, lithic debris and sometimes tools. This amorphous staining and fractured cobbles suggest that the pits were cleaned out and possibly reused (Frison 1978:55).

Brown (1978b) proposes that a tri-hearth complex results from a single processing or cooking activity; the shallow basin used to heat stones with coals, the heated stones used to roast the food stuffs in the roasting pit, and the small pit used for refuse. The spatial arrangement of these pits suggests that one individual could perform several tasks serially or simultaneously such as: heating stones for roasting or boiling; roasting of faunal or floral resources; preparing of meat for immediate consumption; breaking bones for bone grease production; boiling of faunal or floral resources; and marrow extraction. Evidence of all these types of processes can be inferred from the tri-hearth complexes discussed above. The distinctive nature of this feature complex and the apparent short time span from about A.D. 480 to 640 make it an excellent time marker for a 200-year span in the early part of the Late Prehistoric period.

Subsistence Patterns

Subsistence activities at archeological sites can be inferred through several lines of evidence. The physical presence of burned bone or charred seeds are the more direct indicators of hunting and gathering/foraging subsistence strategies. Often, however, only more indirect lines of evidence are available to evaluate subsistence patterns. Projectile points, bifacially flaked knives, graters, scrapers, etc., are generally interpreted as evidence of hunting. Grinding implements such as handstones and milling stones indicate activities associated with processing wild plant resources. Because of the extensive faunal and plant macrofossil data recovered during this project, analysis of this indirect evidence is not necessary to provide a discussion of subsistence patterns.

Animal Utilization in the Church Butte Area

More than 18,000 bone specimens were recovered during this project, 90% from the Austin Wash Site. Twelve taxa including bison, antelope, coyote/dog, jackrabbit, cottontail and a variety of other small mammals were identified, and most taxa were represented at each site that contained faunal remains. As note above, our sample of excavated components is biased toward the Late Prehistoric period. This is no more apparent than in the distribution of bone specimens. From all of the Archaic components, Occupation Areas A and B at 48UT199, Components 1 and 2 at 48UT779 and

48UT370, only 277 bone specimens were recovered, and less than one-third could be identified to a specific genus or species.

This sample is too small to project hunting and procurement strategies for Archaic occupation in the Church Butte area. What is apparent from the sample, however, is that the range of fauna available and utilized in the Archaic was the same as that utilized during the Late Prehistoric period. Larger faunal collections are necessary before researchers can develop a clear picture of Archaic hunting practices in the area.

For the Late Prehistoric period, animal utilization and procurement is better understood. Besides bison, which is represented by at least two animals at the Austin Wash Site, the only other large mammal identified at each of the Late Prehistoric components was antelope. Thus, it not unreasonable to assume that all of the large mammal bone fragments are also antelope. Antelope, then, dominate the faunal assemblages, particularly at the Austin Wash Site, while medium and small mammals are only minimally represented.

At 48UT199 in Occupation Area A, at least two antelope were processed which would have accounted for the bulk of the available meat. One burned jackrabbit femur indicates that jackrabbit was also used. The remaining taxa from this occupation may or may not represent cultural utilization. The large mammal bones from this area, which contained the tri-hearth complex, were highly fragmented suggesting that the bone was processed for both marrow and bone grease.

A similar faunal assemblage was recovered from Component 3 at 48UT779. Antelope again dominated the collection, and only the antelope bone exhibited cut marks and burning, although numerous cottontail rabbit bones were also recovered. The heavy rodent disturbance in this component probably accounts for the presence of the other small mammals.

The majority of the faunal remains from 48UT445 are probably intrusive, most consisting of small mammal fragments. No antelope was identified at this site, although some of the small mammal bone fragments were burned.

With the exception of the Austin Wash Site, the data from the Late Prehistoric components suggests individual rather than communal hunting efforts. As Frison (1978:275-276) has noted, successful animal procurement requires varied hunting and trapping techniques, each suited to a particular animal. For example, jackrabbit is most effectively taken by a communal drive (Frison 1978:257; Steward 1938:39). The lack of large quantities of jackrabbit bones indicates that these animals were probably taken only on an opportunistic basis and that larger mammals were favored over smaller mammals for optimizing the return on individual hunting efforts.

Communal hunting began on the Plains with large scale bison procurement in the Paleoindian period and continued throughout the prehistoric period. Evidence of communal hunting of antelope is presently documented in the Late Prehistoric and Protohistoric periods by only a handful of

sites. The remains of at least 15 antelope at the Austin Wash Site must be interpreted as the result of a communal hunting effort.

The radiocarbon dates from the Austin Wash Site (Chapter 4) clearly place the occupation of the main excavation area of the site at about A.D. 760, making it the earliest known communal antelope hunting/processing site. Other reported antelope processing/kill sites with 15 or more antelope include the Lost Terrace site in Montana, which dates to the ninth century A.D., Firehole Basin 11 dating to A.D. 1325 and the Eden-Farson site dating to A.D. 1720 (Reiss and Walker 1982). Frison (1978:254) describes an antelope trap near Fort Bridger that was probably used in recent historic times for communal drives as well. All of these sites appear to be fall/winter hunting/processing sites, with the exception of the Fort Bridger antelope trap for which no data is available.

Reiss and Walker (1982) note several other antelope processing sites, Galiun, Boars Tusk and Oyster Ridge. No information is available for Galiun or Boars Tusk, but Zier (1982) presents the results of limited testing at Oyster Ridge. The site dates to about A.D. 600 and appears to be a spring kill of at least three antelope. Zier (1982:36) does not believe the site to be the result of communal antelope procurement. He suggests the possibility of an evolution from individual to communal antelope hunting during the Late Prehistoric about A.D. 1000.

The data from this project seem to refute Zier's hypothesis. The Austin Wash Site is probably a communal kill that occurred towards the end of the eighth century A.D. Whether communal antelope hunting has earlier antecedents in the region will depend on the results of future excavations. But the results of other excavations at 48SW5019 (Creasman et al. 1983) and at 48CR3691 (O'Brien, Gardner et al. 1983) clearly demonstrate that antelope and bison were often processed at the same locale and that both bone marrow extraction and bone grease production took place.

The faunal data from the Late Prehistoric components from this excavation project show some consistency between sites. Burned bone represents only about 5% of the total collection at each site, indicating only minimal open fire roasting. Additionally, the ratio of identifiable antelope bone elements to unidentifiable fragments ranges between 1:8 and 1:11. While other researchers have not presented such ratios, we believe that they are relatively high and are indicative of extensive bone processing for marrow and bone grease. These results suggest that the preparation and processing procedures for large mammals during the Late Prehistoric were relatively standard with highly intensive carcass utilization.

The location of features and the full range of processing and lithic reduction activities at the Austin Wash Site demonstrate that the main excavation area was not the "kill" site. It seems unlikely that either the antelope or the bison would be transported very far from where they were killed. At the Wardell site, a Late Prehistoric bison trap, the main processing area was only about 60 m from the kill area (Frison 1978:227).

Attempts to identify the kill area at the Austin Wash Site were unsuccessful. The full range of possible antelope hunting and trapping methods known ethnographically are discussed by Brumley (1984) in detail, including antelope pit traps. Detailed evaluation of the site area around the Austin Wash Site failed to identify any "drive lanes" or possible pit traps. The degrading environment at the site would not allow the topographic identification of such features if they were present. Additionally, such features would have been identified by the magnetic survey in the block survey area. The most reasonable explanation is that some kind of pound or corral was used to entrap the antelope. It is possible that the postholes on the north end of the main excavation area represent the remnants of such a pound.

In general, Late Prehistoric period animal procurement in the Church Butte area seems to have focused on antelope. Bison and smaller mammals were apparently taken as the opportunity arose. Complete utilization of the carcass for meat, hide, sinew, bone tools, marrow and bone grease is the most distinctive feature of faunal procurement in the area during this time period.

Plant Utilization in the Church Butte Area

The recovery of an abundance of charred macrofossils from this project has allowed us to discuss the range of plant utilization during the Late Prehistoric period in the Church Butte area. Charred plant remains were only recovered from Late Prehistoric contexts. Although the Archaic components were sampled, none produced charred seeds.

The analysis of macrofossils from 33 matrix samples from this project resulted in the recovery of 656 charred seeds and achenes from six named and one indeterminate taxa; goosefoot, strawberry, sunflower, peppergrass, Indian rice grass and willow. All of these taxa have reported ethnographic uses for either food or utilitarian items. The predominant taxa at all sites was goosefoot, which occurred in almost every feature that contained seeds. Strawberry was the second most commonly occurring taxon. Each of the taxa will be discussed below in terms of their use by prehistoric peoples in the intermountain region.

Goosefoot

Charred goosefoot (Chenopodium sp.) seeds were recovered from 16 features at four of the sites. Although these seeds appear to be goosefoot, they may be amaranth/pigweed (Amaranthus sp.) which are similar. The charred and distorted nature of the seeds makes positive identification difficult.

Both Chenopodium and Amaranthus were important food plants throughout North America. Ethnographically, in the intermountain area of the western United States, goosefoot seeds were gathered in great numbers and ground into flour for breads and mush (Bye 1972; Chamberlin 1911; Lowie 1909;

Palmer 1878). Many of these seeds were stored for winter use in baskets buried in pits. Young plants and leaves also were used for greens or boiled with meat and fat. Steward (1938:33, 119) mentions that certain Great Basin ethnographic groups burned brush in the fall in order to sow Chenopodium seeds for the spring. These plots were usually located near winter villages in areas where the women gathered wild plants.

Chenopodium or Amaranthus seeds commonly occur in plant macrofossil collections from archeological sites. For example, at Sudden Shelter in central Utah, Chenopodiaceae and Amaranthaceae were the predominant plant families represented by macrofossils (Coulam and Barnett 1980). These seeds were also present in prehistoric coprolites from sites such as Danger Cave, Hogup Cave and in the Glen Canyon area (Fry 1976).

Strawberry

Strawberry (Frageria sp.) seeds were the second most common, occurring in ten features at 48UT779 and the Austin Wash Site. They were recovered from almost every feature that contained Chenopodium seeds. Ethnographically, strawberries were collected and used in season, but generally the fruit was too juicy to be preserved for winter use (Chamberlin 1911; Gilmore 1919). However, some Indian groups boiled them down into a jam for storage (Yanousky 1936). Also, the leaves were sometimes made into a tealike beverage. Charred strawberry seeds were also found in flotation samples from Sudden Shelter (Coulam and Barnett 1980).

Sunflower

Sunflower (Helianthus sp.) is represented by only two achenes recovered from Firepit 3 at 48UT779. The achenes of wild sunflowers were gathered by many ethnographic groups in the western United States. Chamberlin (1911) states that the Gosiute of northwestern Utah prized them as a source of food and oil. The ripe seeds were beaten out of the heads into baskets then eaten raw or ground with other substances and made into cakes (Palmer 1878).

Additionally, the sunflower was cultivated throughout North America and is considered a variety of the wild species H. annuus (Heiser 1951). The sunflower was also widely used in medicine and in ceremonies. The Cheyenne Indians used the sunflower in their ceremonies as did the Hopi (Heiser 1951). Archeological evidence for its use in the intermountain region comes from charred achenes found in flotation samples from Sudden Shelter (Coulam and Barnett 1980).

Willow

Charred willow (Salix sp.) seeds were found in the fill of two features at 48UT779 and the firepit at 48UT445. In the ethnobotanical reports, there is no mention of the use of the seeds; however, references

to willow for making items such as baskets, bowls and baby cradles are common (Chamberlin 1911; Lowie 1924). Gilmore (1919) states that willow poles also were used in the construction of earth lodges, as well as in funeral ceremonies. Willow seeds were recovered in flotation samples from Cowboy Cave in southern Utah (Barnett and Coulam 1980).

Peppergrass

Four features at the Austin Wash Site and the firepit at 48UT445 contained Lepidium sp. seeds. Ethnographically, these seeds were ground and made into bread or mush, as well as used for flavoring other foods (Palmer 1878). The leaves of the plant were eaten as greens (Yanousky 1936). Chamberlin (1911) and Steward (1938) also list it as a food plant for ethnographic groups in the Great Basin. Flotation samples from Cowboy Cave (Barnett and Coulam 1980) and Sudden Shelter (Coulam and Barnett 1980) contained peppergrass seeds. Lepidium seeds also were recovered from prehistoric coprolites from Utah sites (Fry 1976).

Indian Rice Grass

One charred seed of Indian rice grass (Oryzopsis hymenoides) was recovered from the firepit at 48UT445. Because of their relatively large size, Indian rice grass seeds were an important food source for both ethnographic and prehistoric Indian groups in the Intermountain West (Chamberlin 1911; Steward 1938). They were collected in late spring and early summer, parched in trays with live coals and often ground into meal that was used as a mush or gruel, or made into cakes. The seeds also were stored in pits for winter use. Archeological evidence for their use comes from charred seeds found in archeological sites (Coulam and Barnett 1980) and from prehistoric coprolites (Fry 1976).

Unknown

Three other seeds which could not be positively identified were recovered from two features at the Austin Wash Site. They have the general appearance and size of seeds of the Labiatae (mint family) and may be of the genus Agastache. Chamberlin (1911) notes that seeds of Agastache were regularly gathered by the Gosiute Indians. Leaves of the plant were used to make a beverage or as flavoring for foods (Yanousky 1936).

Discussion

The six identified taxa of charred seeds represent only a portion of the total food plants available to prehistoric people of the area. Much of the food plants known to be used ethnographically by the Shoshoni, Paiute or Ute would not be preserved in the archeological record. Leaves and stems from several plants, including arrowroot (Balsamorhiza sagittata) and biscuitroot (Cymopterus longipes), were eaten as "greens" after boiling

them in water (Chamberlin 1911:338). Usually these greens were boiled in a basket into which were added heated stones. The baskets were often placed in a hole when used for cooking (Lowie 1909:188). Biscuitroot now grows near many of the sites in the late spring.

Another major type of food plant that would not leave evidence of its use as macrofossils are roots, tubers and bulbs. According to Chamberlin (1911:338-339), sego lily (Calochortus nuttalli), wild onions (Allium spp.) and spring beauty (Claytonia caroliniana) were eaten in season as well as stored for winter use. One of the more highly prized food roots among many ethnographic groups was yampa (Perideridia gardneri) of which large quantities were cached for the winter (Chamberlin 1911:339; Lowie 1909:188; Steward 1938).

The Ute prepared these roots in an earth oven which consisted of a pit with preheated rocks in the bottom. Into this pit were placed a layer of damp grass and more hot rocks. The oven was then covered with cold rocks and dirt and left for 24 hours (Smith 1974). The only evidence in the archeological record for this activity would be the pit with the rocks, but lacking macrofossils of the actual food plant, this type of feature might be interpreted as the remains of a heating fire.

Because of preparation methods, even the use of seeds as food would not always be represented by macrofossil remains in features. In addition to the Chenopodium, Helianthus and Lepidium seeds, many other kinds of seeds were gathered in great numbers and ground into flour for breads and mush or stored for winter use. Before grinding, some seeds such as Indian rice grass (Oryzopsis hymenoides) were parched with charcoal in basket trays (Kelly 1964:41). Service berry (Amelanchier alnifolia) fruits, an important food in season and during the winter, were mashed on a grinding stone and then spread out in layers and allowed to dry in the sun. When ready for use, this dried material was broken up and boiled with or without meat (Chamberlin 1911:344). These activities would preclude the incorporation of charred macrofossils into the archeological record except accidentally.

Further confusing interpretations of prehistoric subsistence is the fact that charred plant remains do not always represent the direct utilization of the seeds as food by the prehistoric people. Charred macrofossils may occur in features due to the natural prehistoric seed rain or by the indirect use of the plant containing the seed (Minnis 1981). Seeds from weedy species such as Chenopodium may be incorporated into the archeological record by natural means because they grow in disturbed areas and a single plant may produce 100,000 seeds (Herron 1953) which are easily dispersed. Also, charred macrofossils in a cultural feature may be the result of the accidental preservation of seeds during food preparations. For example, Greenhouse et al. (1981) found charred seepweed (Suaeda torreyana) seeds in flotation samples from a modern cholla bud roasting pit in Arizona. These charred seeds may have been introduced into the pit from the seepweed that was used to cover the buds while roasting or the seeds may have become charred as the result of being in the soil near the pit because seepweed plants had not yet flowered at the time.

Plant macrofossil remains may also occur in archeological features as the result of storage activities. As noted above, many food plants were prepared and cached for winter use. The great number of seeds recovered at sites on the Colorado Plateau, such as Sudden Shelter (Coulam and Barnett 1980) and Cowboy Cave (Barnett and Coulam 1980), may, at least in part, represent the storage of food in rockshelters. Kelly (1964:37) reports that the Southern Paiute would cache surplus products for winter use in pits within rockshelters and caves. They would return periodically throughout the season to retrieve the food. The possibility that foods were stored also needs to be considered when making interpretations on the seasonality of the site's use based on the phenology of the plants represented by the macrofossils.

While the results of this analysis provide at least some clues to the kinds of food plants utilized by the prehistoric people of southwestern Wyoming, the relative importance of these plants in their diet cannot be determined from the number of seeds of each type recovered at the sites. Taxa such as goosefoot produce numerous small seeds of which a large number would be required for a meal. In contrast, fewer seeds would be needed from sunflowers which have larger seeds. Therefore, comparing counts of the smaller to the larger seeds may falsely overrepresent the importance of smaller ones in the diet. It would also be difficult to determine the correlation between the quantities of seeds and the number of strawberries utilized.

Although the actual contribution of each taxon to the total subsistence cannot be determined, comparisons can be made between the sites. Both the Austin Wash Site and 48UT779 have charred Chenopodium and Frageria seeds. This indicates that the two sites were occupied sometime during the summer months. Strawberries were available during the summer and, according to the ethnobotanical sources, were usually eaten fresh and not stored for winter use. Goosefoot seeds were collected in great numbers through the summer and into the fall. The occurrence of these two taxa at two separate sites shows that they were probably important foods to the prehistoric peoples of the area.

Firepits, special use pits and ash dumps all contained charred seeds. Only one seed was found in three samples from postholes at 48UT390. This negative data supports the classification of these features as postholes, rather than as some type of food processing or storage pit. A comparison of the charred seeds occurring in the different feature types shows no discernible difference in taxa between them.

Strawberries, which probably never grew in the vicinity of the sites, may have been collected by the older women in the mountains as described by Lowie (1924) for the ethnographic Shoshoni. Even such plants as goosefoot, though probably occurring at the sites, were most likely gathered in areas with open stands of the plants where the prehistoric gatherers could fill their baskets more easily.

Comparison with other Macrofossil Analyses in Southwestern Wyoming

During the past few years at least 300 samples from several different feature types and from over 40 archeological sites in southwestern Wyoming representing the complete range of prehistoric temporal periods have been analyzed (Nelson 1982; O'Brien et al. 1982, Radford 1982; Sall and Pennella 1982; Scott 1982a, 1983a, 1983b; Sender et al. 1982; Van Ness 1982). Except for the study by Sender et al. (1982) in the Red Desert, these endeavors have resulted in the recovery of only a few charred Chenopodium and grass (Gramineae) seeds (Table 27); too few to make direct comparisons with the results of the analysis.

It appears from the limited macrofossil data that seeds from weedy species such as Chenopodium and Amaranthus are the most common taxa in macrofossil collections from southwestern Wyoming. Apparently, they were widely utilized and may have been an important plant food for the Late Prehistoric peoples. The strawberry, sunflower and peppergrass seeds recovered during this analysis represent the only known occurrence of these taxa from sites in southwestern Wyoming, although they were important food plants to the ethnographic groups of the intermountain area. To date, no charred macrofossils have been found in samples from features dating to periods earlier than the Late Prehistoric in southwestern Wyoming.

Settlement Patterns

Another research theme that this project attempted to address was prehistoric settlement patterns in the Church Butte area. Unfortunately, the results from this project do not shed much light on research questions concerning settlement patterns. With the exception of 48UT445 identified as a lithic reduction activity area and the Austin Wash Site identified as an antelope processing area, all of the remaining components that were excavated during this project can be classified as remains of temporary camp sites.

These components all contain a wide range of lithic material, usually a few projectile points, some fragmentary bone and associated features. Specific functions cannot be assigned to most of these excavated components. Additionally, the determination of the season of occupation of these components was difficult. The Archaic components excavated at the sites on this project do not contain any plant macrofossil remains or sufficient faunal specimens which would provide clues to the season of occupation.

The Late Prehistoric components excavated at the Austin Wash Site, 48UT199, 48UT779 and 48UT445 all produced plant macrofossils that indicate a late summer/fall occupation. Although faunal remains were recovered at all of these Late Prehistoric components, only the Austin Wash Site had a sufficiently large collection to indicate that the site was probably occupied in the fall.

Table 27. Charred seeds recovered from several flotation analyses in southwestern Wyoming, Uinta County, Wyoming.

Site	Feature	Seeds Found	Reference
48SW662	1	2 cheno-am	Radford 1982
48SW662	14	1 cf. Cruciferae and 3 unidentifiable	Radford 1982
48SW369		1 complete <u>Juniperus</u> and 4 fragments	Van Ness 1982
48SW2429	3	1 <u>Oryzopsis hymenoides</u>	Nelson 1982
48SW2691	1	1 unidentifiable fragment	Nelson 1982
48CR2200	2	1 unidentifiable	Scott 1983b
48CR2200	16	4 <u>Chenopodium</u>	Scott 1983b
48SW4491	17	1 Gramineae	Scott 1983b
48SW4491	24	1 cf. cheno-am fragment	Scott 1983b
48SW5016	3	1 cf. cheno-am	Scott 1983b
48SW1091	1, 2, 3, 6, 9	10 <u>Chenopodium</u> and 3 <u>Monolepis</u>	O'Brien et al. 1982
48SW4381	D 6	1 Gramineae, 1 <u>Chenopodium</u> , 2 cf. <u>Chenopodium</u> and 2 unidentifiable fragments	Scott 1982a
48CR3472	I	1 <u>Oryzopsis hymenoides</u> and 4 <u>Chenopodium</u>	Sender et al. 1982
	J	9 <u>Chenopodium</u>	
	K	3 <u>Chenopodium</u>	
48CR3495	A	1 <u>Chenopodium</u>	Sender et al. 1982
	C	8 <u>Chenopodium</u> , 1 <u>Atriplex</u> and 1 Leguminosae	
	D	25 <u>Chenopodium</u> , 2 <u>Oryzopsis hymenoides</u> , 1 <u>Opuntia polycantha</u> and 1 Cruciferae	
	J	45 <u>Chenopodium</u>	
	M	700 <u>Chenopodium</u> , 30 <u>Atriplex</u> , 121 Cruciferae, 7 <u>Cleome</u> and 1 <u>Opuntia polycantha</u>	
	N	10 <u>Chenopodium</u> and 5 <u>Oryzopsis hymenoides</u>	
	O	17 <u>Atriplex</u> , 1 <u>Oryzopsis hymenoides</u> and 1 <u>Atragalus</u>	
	Q	3 <u>Chenopodium</u>	
	U	245 <u>Chenopodium</u> , 1 <u>Opuntia polycantha</u> , 1 Cruciferae and 1 Compositae	

In summary, the Archaic components cannot be assigned to any season of occupation, the Late Prehistoric components excavated during this project all seem to represent a summer through fall occupation. Attempting to place these limited site types representing limited seasonal use into a framework of an annual round for prehistoric occupants of the region is premature at this time. Hopefully, the data here will provide a basis for future researchers to develop accurate models of prehistoric settlement patterns in the region.

It should also be noted that these sites are within a half-day's walk of each other and all are found in relatively similar environmental context. It is not surprising that there was only limited variability between the sites in terms of their function and their season of occupation.

Intrasite Patterning

Another research theme that was pursued during the excavation of this project was intrasite patterning. We wished to identify distinct activity areas within the excavation areas at each site. Only the Austin Wash Site had sufficient spatial diversity to analyze spatial patterning of activities within the site. At the Austin Wash Site, the distribution of several artifact classes suggests that there was only one or possibly two major areas of activity in the bone midden area. However, the distribution of the faunal remains seems to suggest that there was no orderly processing taking place at the site and the antelope were haphazardly butchered and the bones broken for marrow and processed for bone grease.

None of the other components excavated during this project demonstrated any differential intrasite spatial patterning. In fact, most of the components represent temporary camp locales and, therefore, the full range of activity present at the site is found in a small, limited geographic area usually less than 15 m in diameter. Our evaluation of the artifacts and features in each of the components seems to suggest single occupations rather than short-term, repeated use of the location. For example, the radiocarbon dates from the main concentration at the Austin Wash Site, although they vary considerably, can be statistically considered a single point in time. The same is probably true for all of the other components that were excavated and dated, although not all of them had several radiocarbon dates.

Technological Analyses

Technological analysis includes examination and assessment of methods of manufacture of stone and bone implements. Our analyses have shown that lithic reduction was a major and occasionally a nearly exclusive activity at all of the sites. Selection of raw materials appears to have been partially a function of the task at hand and the desired end-product. Thus, we find numerous examples of utilized and minimally modified tools and in the same collections, finely retouched, complete or nearly complete

preforms and bifaces. Not surprisingly, the preferred raw material is algalitic chert followed in frequency by quartzites, moss agate and other chalcedonies and cherts. Algalitic chert is immediately at hand at virtually every site.

The majority of formal stone tools and most of the debitage resulted from a bifacial system of reduction. At the Austin Wash Site there is evidence of a desire to produce large bladelike flakes for use and further modification into scrapers and notched flakes. While Sanders (1982) defined the lithic reduction system at the site as a blade technology, we prefer to regard the production and use of these long, narrow flakes as a result of the abundance of the raw material. The primary material, algalitic chert, occurs in tabular chunks large enough to allow the manufacture of bladelike flakes from unidirectional cores. Cores of other material types vary widely in form from multidirectional to bifacial and vary greatly in size suggesting that methods and degree of reduction were not uniform across all material types.

Formal stone tool types recovered from Austin Wash provide information about the implements used by the Late Prehistoric inhabitants to butcher and process antelope. Procurement is represented by a variety of projectile points; butchering by knives, including notched forms, and various utilized and modified flakes with suitable cutting edges; processing of bone for marrow and grease could be accomplished with choppers, gouges, wedges, modified cobbles and the utilized cores; processing of hides and manufacture of bone implements was done with scrapers, drills, graters, knives and, again, a variety of minimally modified flakes.

Several of the tool types found at Austin Wash are unusual and may be diagnostic of Late Prehistoric occupations in southwestern Wyoming. Perhaps the most distinctive class of artifacts from this site are the Rose Spring points. A great number of Late Prehistoric sites dating to the same time period as the Austin Wash Site have similar artifact assemblages, often with Rose Spring points, including 48SW662 (1230 \pm 70 years:A.D. 720 [Bleacher 1982b]), Oyster Ridge (1375 \pm 55 years:A.D. 575 [Zier 1982]), the Cow Hollow Creek site (1280 \pm 85 years:A.D. 670 [Schock et al. 1982]), 48SW1708 (1290 \pm 80 years:A.D. 660, 1160 \pm 60 years:A.D. 790 [Miller 1982]), 48UT199 (1490 \pm 60 years:A.D. 490, 410 \pm 80 years:A.D. 460, 1320 \pm 60 years:A.D. 630 [Tucker 1982]) and 48UT779 (1130 \pm 80 years:A.D. 820 [Chapter 6, this report]). Undated sites with Rose Spring points in the Green River Basin probably dating from the same time period include 48LN74 (Brown 1979), 48UT395 (Miller 1982) and 48UT361 (Bleacher 1982b).

In addition to Rose Spring points, several other unique classes of artifacts have been recovered from the Late Prehistoric components at 48UT199, 48UT779 and the Austin Wash Site. It appears that these artifact classes may be diagnostic of the Late Prehistoric period in the area. At both the Austin Wash Site and 48UT779, hafted bladelike flakes were recovered. Although there was some variability from specimen to specimen, the four which possessed two notches were all notched on opposite faces (Fig. 65). Three of these were recovered from the bone bed at the Austin

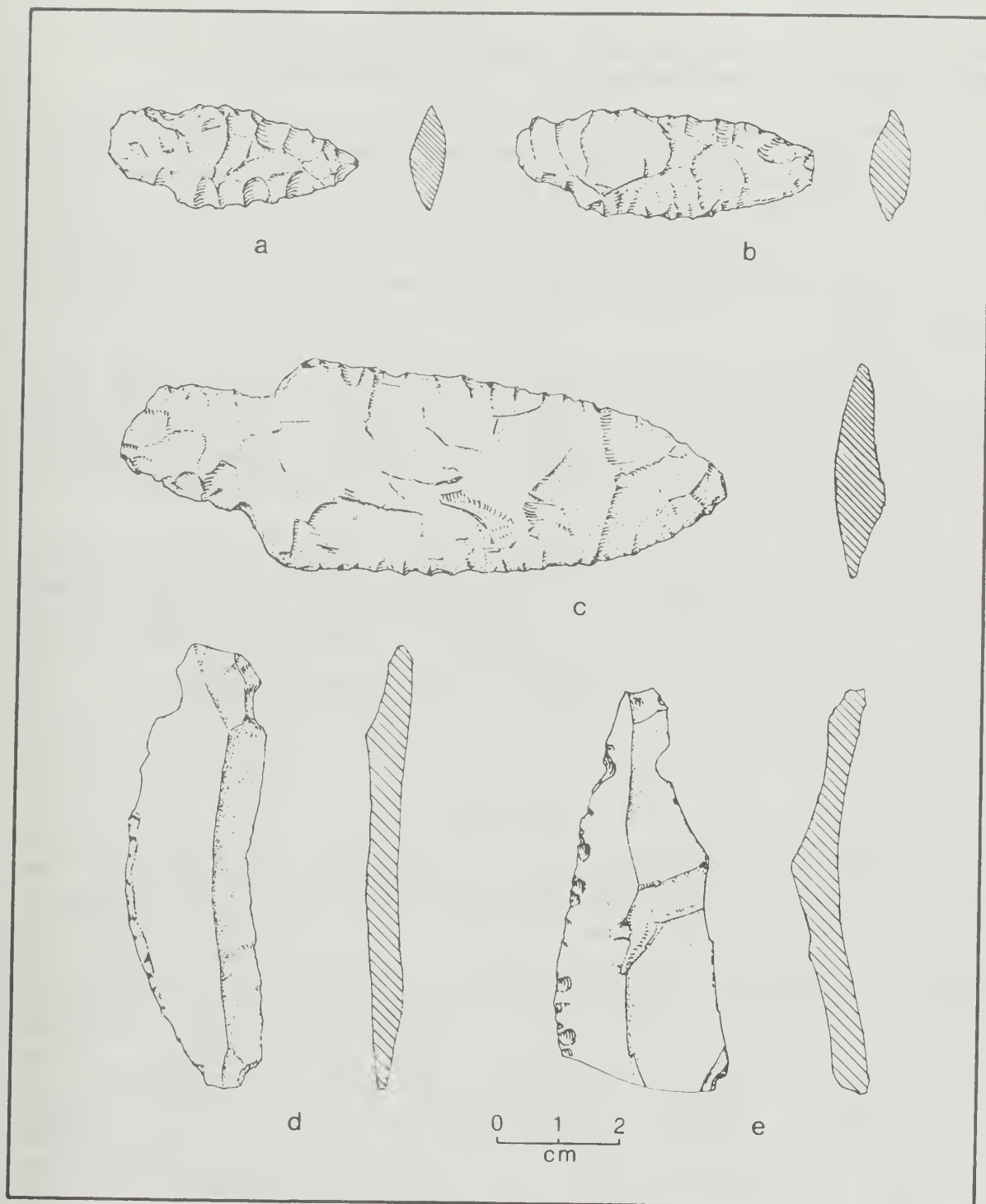


Fig. 65. Selected Late Prehistoric artifacts, Uinta County, Wyoming. a, asymmetrical hafted knife (48UT779); b, asymmetrical hafted knife (48UT199); c, asymmetrical hafted knife (48UT390); d, hafted bladeflake (48UT779); e, hafted flake (49UT390)

Wash Site and one from the upper component at 48UT779 which yielded Rose Spring points and a radiocarbon date of 1130 ± 80 years:A.D. 820.

Asymmetrical stemmed knives were recovered at 48UT199, 48UT779 and the Austin Wash Site (Fig. 65). The asymmetrical stems would create a slightly cocked appearance of the tool when hafted. The specimen from the Austin Wash Site is quite large (at least twice the size of the other two specimens), but has nearly identical morphology. The specimens from the Austin Wash Site and 48UT779 are from dated Rose Spring components. The specimen from 48UT199 is from culturally mixed strata well above the Middle Archaic feature complex in Occupation Area B at the same level as a broken Rose Spring point.

The recovery of bone awls and remnants of bone bead or bone tube production at the Austin Wash Site indicates some reliance on bone as a material for the manufacture of tools and ornaments. The limited faunal remains from the other excavated Late Prehistoric components makes it difficult to determine how important bone implements and ornaments were to the Late Prehistoric occupants of the region.

It is suggested that the unusual scraper technology, hafted blades with notching on alternate faces, the asymmetrical stemmed knives, Rose Spring projectile points and bone bead/tube production are indicative of a distinct Late Prehistoric occupation within the Green River Basin. However, until this cultural manifestation is better understood, it is not appropriate to designate a phase name for the period or a complex name for the tool assemblage.

Methodology

One other research aspect of this project was to attempt to use magnetic surveying as a means of identifying subsurface cultural deposits at these sites. The results of the magnetic survey are included in Appendix 2 of this report. Although several magnetic anomalies could be associated with thermally altered rock concentrations and a Rock-filled Firepit, the magnetic survey produced equivocal results. By and large, however, the magnetometer grids were outside the main areas of prehistoric occupation and, thus, did not identify any of the feature complexes that were excavated at the sites. The underlying geological substrate has a high iron content and produces a fair amount of background noise. Additionally, the topographic variability of the dune sites produces changes in the magnetic fields as they are measured on the ground. In summary, magnetic surveying in southwestern Wyoming needs to be further tested before it can be accepted or rejected as a technique for identifying subsurface cultural deposits.

CHAPTER 11

SUMMARY

In 1983, P-III Associates conducted a data recovery program on six archeological sites in southwestern Wyoming. These six sites were considered significant and potentially eligible for the National Register by the Bureau of Land Management. Because all six sites were in the final construction corridor of the Frontier Pipeline, they were subjected to a data recovery program prior to pipeline construction.

Excavations at these six sites, the Austin Wash Site (48UT390), 48UT199, 48UT779, 48UT370, 48UT445 and 48UT377, produced abundant information concerning prehistoric occupation in the Church Butte area in southwestern Wyoming. Occupations from the Early Archaic, Middle Archaic and Late Prehistoric periods were excavated.

These occupations spanned almost 5500 years. The earliest occupation was identified at 48UT370, where a firepit, representing an Early Archaic occupation, was dated to about 4500 B.C. A low, weathered dune (Dune D) at this site has produced limited but consistent evidence of prehistoric occupation in the Early Archaic period. The assemblage from this occupation is sparse and few interpretations can be made about the function of the site during this period. The presence of several side-notched points and some fragmentary bone and the lack of charred seeds and ground stone suggest that the Early Archaic inhabitants of the site focussed on hunting and animal utilization.

From this same dune another feature was radiocarbon dated to about 2300 B.C., the Middle Archaic. Unfortunately, this feature was not associated with any identifiable activity area.

Another Middle Archaic date of about 2700 B.C. was also obtained from a slab-lined firepit in the lowest component at 48UT779. Again, no discernible activity area was associated with this feature.

Two Middle Archaic components were identified at 48UT199. In Occupation Area B, a Middle Archaic activity area dating to about 2200 B.C. contained several different features including firepits, special use pits and postholes. Again, the lack of charred seeds and ground stone and the presence of chipped stone tools and bone fragments suggests an emphasis on hunting activities.

Another Middle Archaic component is represented in Occupation Area C at 48UT199. This occupation was not radiocarbon dated, but is cross-dated to the Middle Archaic based on the projectile points recovered from the excavations. This activity area is unusual in that no distinct features were identified. Only a slight stain with thermally altered rock was excavated, yet, this activity area produced a high frequency of formal tools. This activity area appears to have been a primary lithic reduction area.

The bulk of the artifactual material from this project is associated with occupations from the Late Prehistoric Period. Late Prehistoric components were excavated and radiocarbon dated at four sites, the Austin Wash Site, 48UT199--Occupation Area A, 48UT779 and 48UT445.

The earliest Late Prehistoric occupation is represented by a tri-hearth complex and associated activity area in Occupation Area A at 48UT199. This occupation is dated to about A.D. 500 and probably represents an animal and bone processing activity locus.

Analysis of the radiocarbon dates from the Austin Wash Site clearly place the Late Prehistoric occupation at the site around A.D. 800. This occupation was the most extensively excavated during the project. More than 700 formal and expedient tools, over 20,000 pieces of debitage and several thousand bone fragments were recovered. The artifact data along with information from more than 15 features presents a clear picture of a single late summer/fall activity of processing antelope.

Another Late Prehistoric component was excavated at 48UT779. This component produced a small artifact assemblage with several features and dates to about A.D. 900. The abundance of charred seeds, although plant processing artifacts such as ground stone were not recovered, and the presence of bone fragments suggests that this Late Prehistoric occupation represents a more balanced use of plant and animal resources than in the preceding Archaic period.

Finally, one other Late Prehistoric component dating to about A.D. 1000 was excavated at 48UT445. This site is unique in that the only tool recovered was a single biface fragment. The bulk of the artifact material, debitage, seems to indicate that the site was used as a lithic reduction locale rather than a short-term habitation camp as the other component might be interpreted.

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APPENDIX 1

POLLEN ANALYSIS FOR THE FRONTIER EXCAVATION PROJECT

by Craig S. Smith
P-III Associates, Inc.

A total of 12 samples from features and soil matrix at four sites, 48UT390, 48UT779, 48UT370 and 48UT199, were processed and examined for pollen during this project. Only five samples contained sufficient pollen for analysis. These samples include the two feature samples from 48UT370, the two nonfeature samples from 48UT390 and the one nonfeature sample from 48UT199. The seven other samples, all from features, lacked pollen.

This analysis was performed in the hope of producing information on the types of plants used by the prehistoric peoples of the area. Unfortunately, due to limited number of samples containing pollen, few inferences and conclusions can be made. The noticeable differences in the relative frequencies of pollen types between samples could be the result of several factors. The analysis does show, however, that sufficient pollen can be obtained from eolian deposits in southwestern Wyoming. Nonfeature samples from within site areas, as well as samples from stratigraphic columns, would probably provide valuable data. Because pollen appears to be poorly preserved in features, analyses of feature samples should focus on the recovery of plant macrofossil remains.

Methods

Twelve samples from features and bulk soil samples were examined for pollen. All samples were extracted following procedures outlined by Meh-ring (1967) for alluvial and eolian deposits. Extracted material was stained with basic fuschin and mounted on slides with glycerol. Pollen was counted at 600x magnification and identifications were made using pollen keys and modern reference material provided by the Garrett Herbarium, University of Utah.

Pollen preservation varied from fair to poor among the samples. Because of insufficient pollen, only a 125 grain count was obtained for some of the samples; although over 200 grains were counted for other samples. These counts are less than what is generally considered statistically sufficient for evaluating fluctuations in relative frequencies of the

different pollen types between samples. The variations noted in this analysis may be the result of sampling error.

Results

The only feature samples containing pollen were the two from 48UT370. All three of the nonfeature samples, including two from 48UT390 and one from 48UT199, had pollen; however, there was insufficient pollen in the feature samples from these two sites and 48UT779. The pollen grains in the 48UT199 samples were also poorly preserved and eroded.

The relative percentages of the pollen types for the five samples containing sufficient pollen is shown in Fig. 66. In these samples, pine (Pinus) pollen ranges from 9 to 20% and is the result of long distance transport. The other arboreal pollen types include a grain of spruce (Picea) at 48UT390 and juniper (Juniperus) in samples at 48UT390 and 48UT370.

The major nonarboreal types are cheno-ams (Chenopodiaceae), greasewood (Sarcobatus), sagebrush (Artemisia) and grass (Gramineae). Cheno-ams, the predominant type, ranges from 27 to 42% of the total pollen. In most samples, greasewood occurs at less than 10%, except in one sample from 48UT390 where it is 20%. Sagebrush is the second most common pollen type, fluctuating between 18 and 29%; grass pollen is below 10% in all samples.

Low percentages of the Ambrosia-type Compositae (members of the sunflower family including ragweed [Ambrosia] and bursage [Franseria]) and other Compositae (members of the sunflower family including rabbitbrush [Chrysothamnus] and sunflower [Helianthus]) are present in most samples. Among the other types, Mormon tea (Ephedra), occurs in a sample from 48UT390; prickly pear (Opuntia) is in the other one from 48UT390; and the two samples from 48UT370 contain parsnip family (Umbelliferae) and sedge family (Cyperaceae). An indeterminate category contains grains that were too badly eroded and preserved for identification.

Discussion

Unfortunately, due to the few samples containing sufficient pollen for analysis, few comparisons and conclusions can be made. The relative frequencies of the pollen types dominated by cheno-ams and sagebrush in these five samples is about what is expected from the desert shrub vegetation of southwestern Wyoming (Scott 1982b).

The two feature samples from 48UT370, an Early Archaic site which dates to at least 6480 years ago, are fairly similar, except for slightly higher greasewood and Compositae pollen types in Firepit 2. This may be the result of sampling error or, perhaps, be due to different functions of the features.

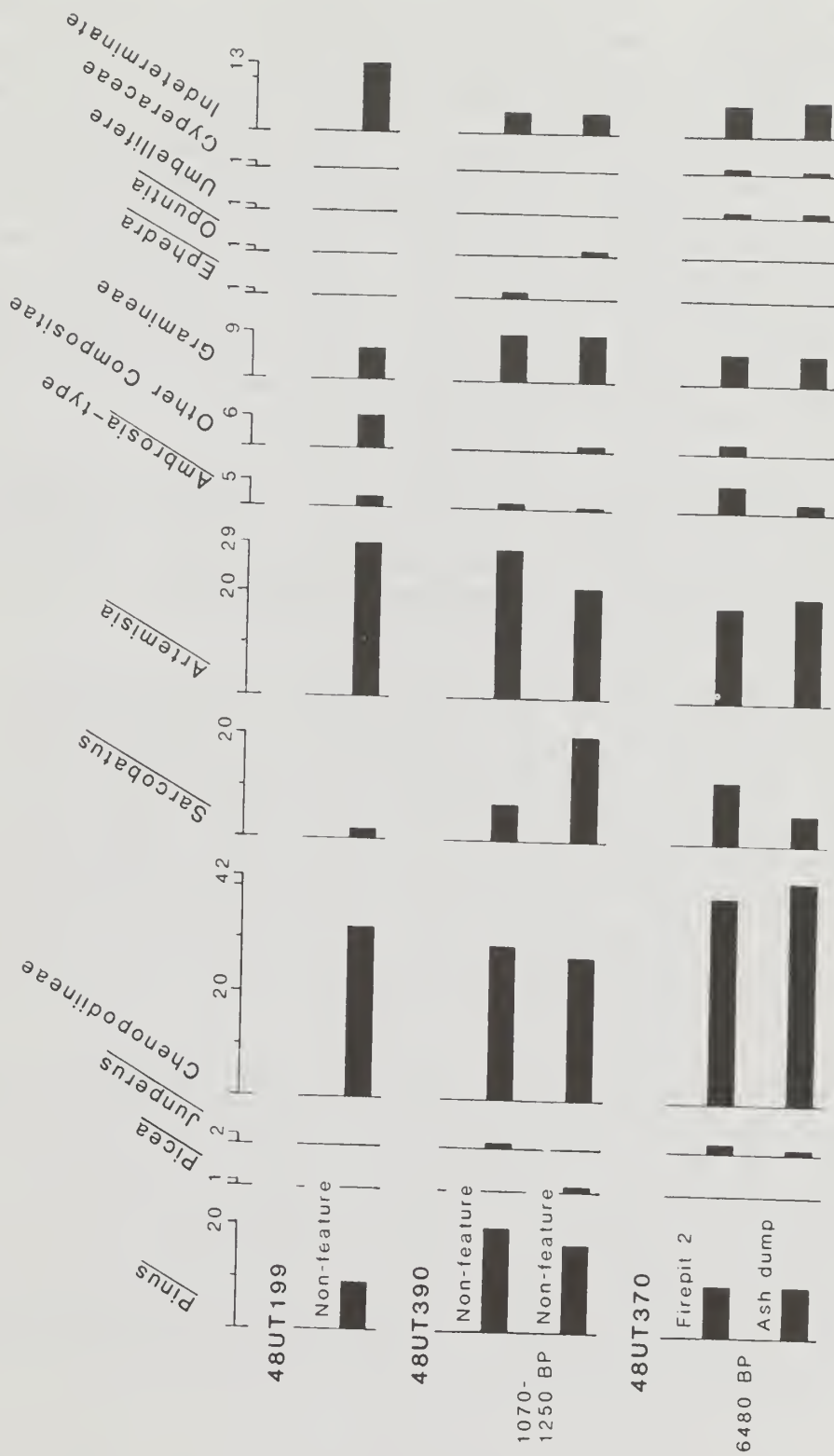


Fig. 66. Diagram of pollen recovered from sites 48UT199, 48UT390 and 48UT370 near Church Butte, Uinta County, Wyoming.

More pronounced differences are evident between the two feature samples from 48UT370 and the two nonfeature samples from 48UT390, a Late Prehistoric site dating between A.D. 630 and 930. The two samples from 48UT390 contain more pine, slightly more grass and less cheno-am pollen than the features at 48UT370. Without more samples from intermediate chronological periods for comparison, these differences are difficult to interpret. Fluctuations in the past climate may account for the changes or the lower percentages of cheno-am pollen at 48UT390 may be due to differences in site locations. The apparent differences may also be magnified by comparing nonfeatures at one site to features at the other.

A comparison between the two samples with pollen at 48UT390 shows that one has twice the percentage of greasewood and also contains grains of prickly pear. This may be due to human activity at the site or to natural differences in vegetation growing on the site.

This pollen analysis does indicate that pollen is often preserved in the eolian deposits of southwestern Wyoming. Samples from within the site but outside the feature appear to contain the best preserved pollen. Because of poor pollen preservation in the features, plant macrofossil analyses by flotation would probably be more profitable for determining the kinds of food plants utilized prehistorically.

APPENDIX 2

MAGNETIC SURVEYING ON THE FRONTIER PIPELINE EXCAVATION PROJECT

by

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One of the recurrent problems in implementing data recovery programs is the difficulty in rapidly locating main areas of prehistoric occupation without extensive testing. One method of locating cultural deposits without extensive hand or backhoe testing is magnetic surveying. Magnetic surveying is a method of detecting changes in the subsurface magnetic field. Such changes are often caused by buried cultural features and structures and under optimal conditions magnetic survey can be used to identify main areas of prehistoric occupation, thus reducing the amount of time necessary to investigate sites. One of the primary goals of this data recovery project was to test the efficacy of magnetic surveying in sand dune environments in southwestern Wyoming as an aid in locating subsurface cultural materials.

Magnetic surveys were conducted on all six Frontier sites, Austin Wash Site (48UT390), 48UT199, 48UT779, 48UT370, 48UT445 and 48UT377. Thirty of 35 anomalies identified as possibly cultural in origin were excavated. One rock-filled firepit was found at the Austin Wash Site, and several concentrations of thermally altered rock and charcoal stains were found at 48UT199 and 48UT370. No cultural features were discovered by the magnetic survey and testing on the remaining sites. Additional excavations in the magnetic survey area at 48UT370 uncovered several features that could be identified in the magnetic survey data. Although the magnetic survey on the Frontier sites was not as successful as hoped for, it does provide a database from which future magnetic surveys in the area can benefit.

Background

Magnetic surveying methods depend on the measurement and recognition of anomalies in the earth's magnetic field caused by changes in the concentration, orientation and type of iron oxides in the soil. In culturally sterile alluvial or eolian sediments, iron oxides, in the form of hematite, produce a distinctive, often uniform, magnetic field at the ground surface. Soil disturbances, such as the digging of a firepit, can result in localized changes in the magnetic properties of the oxides. These changes often produce measurable variations or 'anomalies' in the magnetic field over the area under study.

Causes of Magnetic Anomalies

The energy forms causing magnetic changes in the soil can include thermal mechanisms, detrital and soil disturbance mechanisms, and chemical mechanisms. Each is discussed below.

Thermal Mechanisms

The firing of the soil in hearths and in burned structures has traditionally produced the largest and most easily recognizable magnetic anomalies associated with prehistoric cultural features. Iron oxides present in the soil are magnetically enhanced and may be transformed to more ferromagnetic forms such as magnetite and maghemite. Even if the burned material does not remain in its original position after being fired but is transported to a midden or redeposited by wind or water, the magnetic enhancement is still often measurable.

Detrital and Soil Disturbance Mechanisms

Disturbance of the original sterile sediment by digging or by subsequent geologic processes often leaves measurable magnetic anomalies. The top soil is typically more magnetic than underlying sediments and removal of the A horizon or its redistribution is often reflected in the magnetic record. Unburned pit structures, borrow areas or other depressions have anomalies produced in this manner.

Chemical Mechanisms

Anerobic decomposition of organic matter also alters the iron oxide content and distribution in the soil and is another mechanism for producing magnetic anomalies. It may have produced some magnetic anomalies identified for this project.

Measuring Anomalies

Anomalies can assume a variety of shapes and magnitudes but are usually composites of two basic categories, the monopole and the dipole. The monopole anomaly consists of a group of measurements which has a magnitude greater or less than surrounding values in the immediate vicinity. The dipole anomaly consists of two groups of measurements, one group greater than surrounding values and the other group less, but closely associated with the first group.

There are several techniques and instruments for measuring magnetic anomalies in the earth's field, but the most practical in an archeological context are proton precession magnetometers which measure spatial variations in the magnetic field on a grid of points at some fixed distance above the surface. The unit commonly used for measurement is the gamma (.00001 gauss) which is approximately 1/50,000 of the earth's total field. The results are usually displayed by contour maps or x-y profiles. Once anomalies with suspected cultural features are isolated, reasonable predictions can often be made about their location, geometry and occasionally their composition.

Additionally, 'noise' affects the ease with which cultural features can be detected from the survey. 'Noise', as defined here, can be considered extraneous contributions to the earth's magnetic field by objects which tend to obscure archeologically interesting anomalies. Intrusive geology with any appreciable iron content can produce strong noise which masks the typically weak archeological fields. Soil disturbance caused by natural or cultural mechanisms can also produce noise. Magnetic fields from recent iron trash, such as tin (iron) cans or bits of machinery, will often obliterate anomalies. These confusing effects can usually be minimized by appropriate computer image enhancement such as filtering, but in some instances the magnetic archeological record is not detectable above the surrounding noise.

Magnetic Survey Procedures

Magnetic field measurements were conducted on 20 by 20 m 'blocks' of data, the standard survey unit. This block was oriented toward magnetic north and readings were taken at 1 m intervals.

Measurement of the magnetic field was accomplished using two Geometrics proton precession magnetometers (G856,G826); in the difference mode both capable of an accuracy of one part in 200,000. One magnetometer remained stationary on the site to monitor the time fluctuations in the earth's field (diurnal drift) while the other instrument measured the field over the study area at a 1 m sample interval. This interval was chosen because it represents a reasonable compromise between resolution and the efficiency of surveying. Higher resolution could be obtained with smaller intervals, but greater amounts of time would have been necessary to complete the survey. It is feasible to cover up to five 20 by 20 m blocks

per day under ideal conditions using 1 m intervals, although two to four blocks was the average during the survey for this project.

Three people were used for the survey: one person, wearing nonmagnetic clothing, carried the sensor; another carried the instrument pack for the moving sensor; the third person moved the positioning ropes and monitored the base station. Although care was taken to ensure accurate positioning of the sensor during the survey, it is reasonable to assume a positional error of ± 10 cm for any given reading due to terrain irregularities. In addition, the height of the sensor varies over the course of a survey although efforts were taken to account for small scale topographic changes. The magnetometers are factory calibrated to produce combined errors of ± 0.35 gammas, but once positional errors are taken into effect, the repeatability of any one reading might be more conservatively estimated at ± 1.0 gamma.

Data Processing

Data collected during the survey were first computer-corrected for diurnal drift and then subjected to error checking routines. Preliminary contour maps were then produced at scales which best enhance the magnetic fields caused by archeological features. Where necessary, convolution filtering was performed on the data to reduce contributions from the geology, large features or recent iron trash. Convolution filtering is similar to removing general trends from data by polynomial regression, however, convolution filtering replaces each data value by a weighted sum of the surrounding data and allows more control over the size of the remaining residuals. As a result of this filtering process, anomalies of specific sizes remain unchanged while anomalies which are smaller and/or larger than the averaging unit are diminished or removed.

After this preliminary processing, color density contour maps were produced on a CRT computer screen with the magnitude of the readings keyed to a color scale. The computer allows interactive alteration of color scales and magnification of smaller anomalies to best enhance the anomalies of interest. The maps generated for this project employ parameters which best depict cultural features. An example of such a map depicting a magnetic contour map of Dune D at 48UT370 is presented in Fig. 67.

Data Interpretation

The interpretation of magnetic survey data from an archeological site requires the assimilation of a variety of information to isolate anomalies caused by cultural features. Initially, either by independent research or through interaction with project archeologists, the geophysical researcher must gather pertinent information about the characteristics of features expected to occur on the sites. The researcher must then estimate the types of anomalies that these features might create. This process of estimating magnetic anomalies typically involves the comparison of anticipated features with the anomalies from magnetic surveys undertaken on other

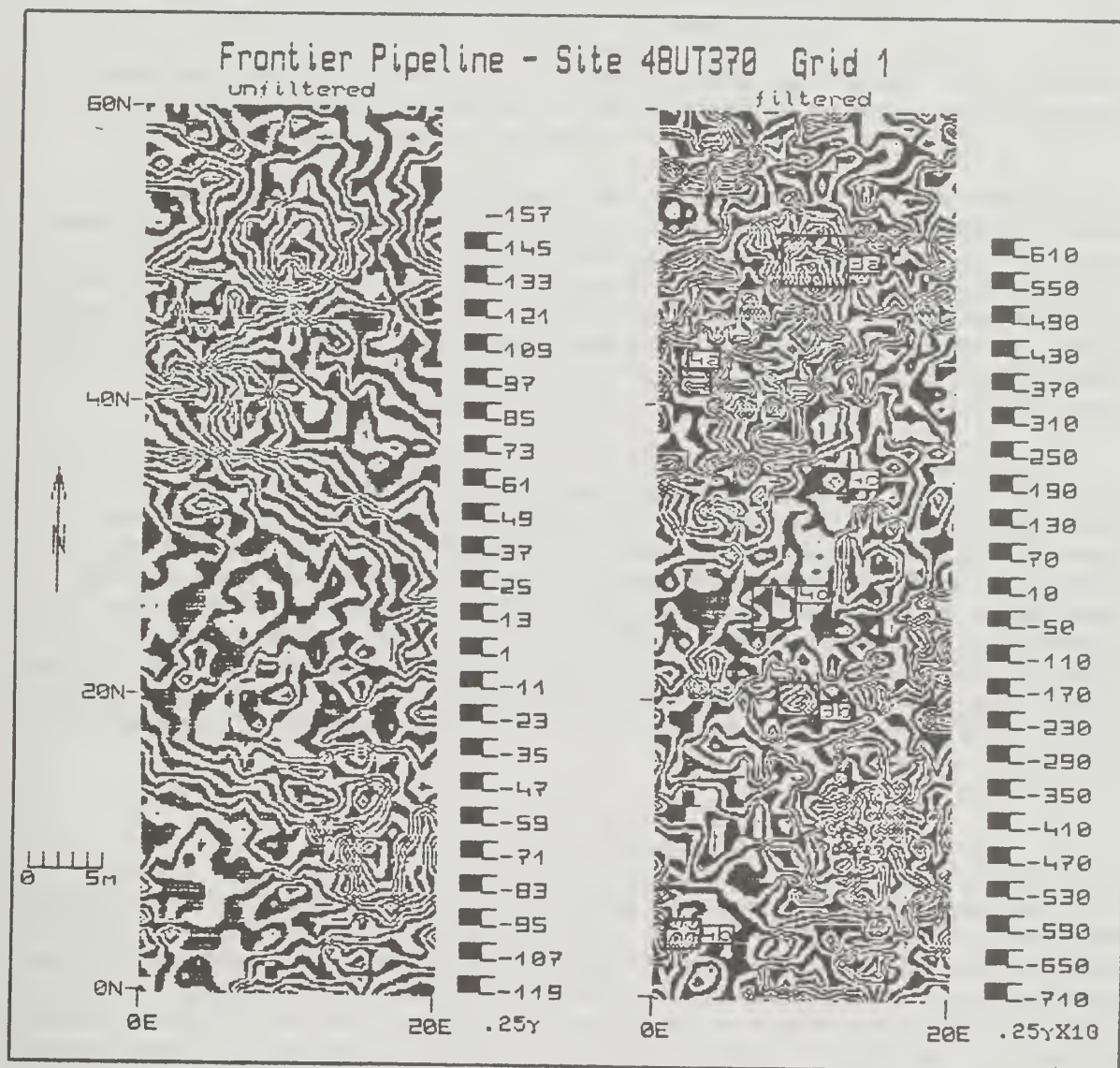


Fig. 67. Magnetic contour map of Dune D, 48UT370, Uinta County, Wyoming.

similar sites. When feasible, magnetic anomalies are mathematically modelled from idealized features which have been assigned a geometry and magnetic contrast typical of the area under examination.

The magnetic survey data to be analyzed is then searched for the presence of likely anomalies, and if necessary, computer enhancement is used to reduce unwanted magnetic effects from noncultural sources. Finally, anomalies suspected of having cultural origin are selected and assigned a probability of cultural origin. In areas such as southwestern Wyoming where magnetic surveying has not previously been conducted, it is difficult to identify anomalies representing cultural activities.

Encountering an anomaly in the magnetic field data does not necessarily insure that it is caused by an archeological source. As noted above, iron compounds present in geology and soil or surface debris can often mask or obliterate the weak magnetic fields from cultural features that are present. However, the anomalies produced by cultural features often have attributes which distinguish them from anomalies caused by other sources. Cultural feature anomalies often have a distinctive magnitude, shape, polarity and size which help identify them.

Since anomalies selected for field evaluation have different probabilities of actually being cultural features, a number system was devised that conveys the likelihood of encountering a cultural feature at the location of the anomaly. An anomaly assigned a value of one (1) has been determined to be of cultural origin, generally a specific source can be identified, e.g., firepit, pithouse, etc. An assigned value of two (2) indicates a probable feature. A value of three (3) for the anomaly indicates that it has some of the characteristics of a cultural feature. Four (4) is assigned to anomalies which may possibly be cultural in origin. Anomalies assigned a value of five (5) are curious anomalies, but are most likely not cultural in origin.

Evaluation of Results

The completion of a rigorous remote sensing program necessitates a re-examination of all phases of the analysis to determine which procedures were successful and which might require adjustment. The success of a magnetic survey depends on the environment in which archeological sites are located and on the geometry and magnetic contrast of the features themselves. Consequently, ground truthing of selected anomalies is essential to refine the model(s) of features, validate the results of the predictive survey, as well as aid in more effective and judicious selection of anomalies for investigation.

It is also important to re-examine those areas which contained cultural features but lacked associated magnetic anomalies. The correlation of excavation data on these features with the contour maps aids the archeologist and geophysical researcher in three ways:

1) It helps identify what types of archeological features are being masked by local variations of the magnetic field. If the source of the masking can be identified, it may be possible to filter it out.

2) The correlation indicates types of archeological features which are present but which have not been effectively modelled and thus, missed in initial interpretation and selection of anomalies.

3) The correlation supports, confirms or negates the validity of the mathematically derived model(s) of the archeological features by indicating the success or failure rate of the predictions.

Finally, the data can be used to create an empirical database consisting of the results of the magnetic survey and excavation information. Where there is sufficient magnetic contrast between archeological features and the surrounding matrix, and where noise levels are low, magnetic surveys can be undertaken with a reasonable expectation that they will be successful. The use of magnetic surveys can be avoided in areas where conditions are not suitable or where the recovery would not be cost effective.

Magnetic Survey Results

The results of the magnetic survey are presented separately for each of the six sites. For each site there is a brief discussion of its location and any environmental factors that might influence the magnetic field in the area. While the magnetic data from all sites has undergone error checking and diurnal drift correction, any special filter is noted. Magnetic anomalies are then discussed with the results of the actual excavation.

48UT390

Of all the sites surveyed in this area, site 48UT390 is the most suitable for magnetic surveying for cultural features. Contributions from noncultural magnetic sources which might mask archeologically significant anomalies appear to be small and easily recognizable. The survey identified six magnetic anomalies in the magnetometer grid east of the main concentration of cultural material at the site. All six of these anomalies were excavated.

Unfortunately, only one of the six anomalies was a cultural feature (Rock-filled Firepit 1). Four did not produce any results, while the final anomaly represented a filled and buried stream channel. Although the prospects for identifying cultural features using magnetic methods at this site were considered to be good, it appears that the magnetic properties of the underlying sediments and geologic features precluded the detection of magnetic anomalies from cultural sources. Future work should focus on identifying the magnetic properties of geologic features in the area and the composition and deposition of the underlying sediments.

48UT199

As noted in Chapter 5, 48UT199 is a dune site with underlying magnetic pavement which produces moderately high noise levels. The desert pavement produced some noise which was easily filtered out. The magnetometer grid was placed on the dunes near Occupation Area C. Because the magnetometer survey grid lies very near the Emigrant Trail and old U. S. Highway 30, it is not surprising that a variety of iron objects were present on the surface. These objects, however, do not contribute significantly to the magnetic field. Topographic variation is present but was recorded in the field and accounted for in the interpretation.

Four magnetic anomalies were excavated, one was produced by natural underlying desert pavement, two did not have cultural features, but did have concentrations of thermally altered rock and debitage. The fourth contained a 3 cm thick ash stain with thermally altered rocks in the northern portions of Occupation Area C. Because of this discovery, the excavation units were expanded in this area. A total of more than 70 m² were excavated, but no other features were indicated by the magnetic survey and none were found. The distribution of thermally altered rock correlated with differing magnetic intensities in the survey grid.

48UT779

Only two magnetic anomalies were selected for investigation on this site. They had a low probability of cultural origin. Excavation of these anomalies eventually confirmed their geologic nature.

48UT370

The site surface of 48UT370 is relatively undisturbed with some topographic variation. The small scale, large amplitude anomalies prevalent on other sites appear absent on 48UT370. Some large scale anomalies anticipated to be caused by geology are present but are easily removed by filtering.

The magnetic field measured over this site is suitable for detection of archeological features, if they are sufficiently magnetic. Anomalies from geologic or recent iron sources are less prevalent at this site.

Magnetic surveying was conducted on both Dunes B and D. On Dune B, four areas were identified with possible cultural anomalies. All four were excavated and the source of the anomalies appears to be geological in nature. The magnetic survey, however, was able to clearly identify two back-filled test pits from the previous MAPCO excavations on the dune.

Six anomalies were identified and tested in Dune D. The source of three of the anomalies could not be identified after excavation. The

fourth anomaly appears to be a piece of iron or polarized rock. The fifth and sixth were of cultural origin. The fifth was a small concentration of large, thermally altered rocks, while the sixth was a small (10 cm in dia.) ash stain.

In addition, the magnetic survey of Dune D identified the large test unit in which the Early Archaic component was first discovered at the site. Additional testing was conducted around this previous test unit. Comparison of the results of this excavation with the magnetic survey data demonstrates that the features and some concentrations of thermally altered rock could be identified in the magnetic survey data. Unfortunately, these anomalies were not well defined and hence, were not selected for excavation. Such excavation data is invaluable to refining the models of the magnetic signatures of cultural features in this area.

48UT445

Three magnetic anomalies at this site were identified to the southwest of the main excavation area. All three anomalies were assigned low probabilities of being cultural in origin. Excavation of all three anomalies failed to identify any cultural features. Variation in the caliche appears to have caused these anomalies.

48UT377

Five anomalies of medium to low probability of cultural origin were excavated on this site. None produced cultural features. In two units, the underlying iron rich clay substrate was within 10 cm of the present ground surface, probably accounting for the anomaly. In one other unit, a large, pink quartzite cobble caused the anomaly. In the last two test units, buried ant hills were found to have caused the variation in the magnetic field.

Summary

During the month of April, 1983, magnetometer surveys were undertaken by Spectrum Geophysics on six archeological sites being investigated by P-III Associates as part of the Frontier Pipeline Project. The magnetometer surveys located 35 anomalies with an average probability number of 3.7. Thirty of the anomalies were excavated, locating one rock-filled firepit, several ash stains and areas of thermally altered rock. The magnetic procedures also identified several natural phenomena, including large animal burrows, loose pockets of sand and organics, and other geological features.

The magnetic environment encountered on these sites varied widely, despite some similarities in physical appearance. On some sites the presence of iron rich rock in desert pavement, which underlies many of the sites, made the interpretation of the data problematic. Sites 48UT370 and

48UT390 were originally thought to be relatively free of magnetic noise induced by the desert pavements. However, excavation of the anomalies on these sites was not as fruitful as originally anticipated. The highly magnetic desert pavement caused fluctuations in the magnetic field over most sites due to variations in the depth of overburden, and to undulations and deflations in the stratum. Secondary processes contributing to the noise levels observed on the sites may consist of the leaching of magnetic materials through the caliche bedrock forming pockets of higher magnetic intensity. Disturbances or disruptions in the desert pavements, such as bioturbation, erosion or other physical means, may have also caused fluctuations in the magnetic field.

The magnetic survey of the Frontier Pipeline sites and subsequent excavation of the anomalies resulted in a fairly low identification of cultural features. However, these poor results should be interpreted cautiously for several reasons. On at least one site, 48UT779, the magnetic survey was conducted on the edge of the main area of cultural material, it is not surprising that no cultural features were located during the excavation of the magnetic anomalies. Second, the lack of features in the low probability magnetic anomalies at 48UT445 and 48UT377 is the result of extremely limited prehistoric activities that took place at these sites. The magnetic survey selected the most likely anomalies of cultural origins from a "poor" sample of low probability anomalies. Thus, the utility of magnetic surveying in sand dune environments in southwestern Wyoming has not yet been fully tested. However, the results of this survey have allowed us to suggest procedures that will aid in selecting sites for magnetic surveying in the region in the future.

Although the magnetic surveys of this section of the Frontier Pipeline did identify archeological features in several cases, it appears that additional information is needed for the advance determination of the suitability of a given site for the location of cultural features using magnetic methods. Recent magnetometer surveys undertaken by Spectrum Geophysics in other active or unsettled dune areas detected only weak magnetic anomalies from cultural features. It appears that a well defined soil profile present at the time of occupation often helps in enhancing the formation of magnetic anomalies from cultural processes. Soil formation tends to vertically 'stratify' magnetic materials in the soil; disturbance of this stratification augments the anomalies formed by other cultural processes such as firing and organic decay. Prior to any further magnetic surveying in the Frontier pipeline area, it is suggested that susceptibility samples of the soil matrix be taken at 10 cm depth intervals. This would help to identify the degree of stratification of magnetic material in the soil, and would provide a relative determination of the percentage of iron oxides present. This data should allow a more quantitative assessment of the suitability of this type of a site for magnetic surveying in the future.

The information provided from the excavation of these sites on which magnetic surveying has been undertaken is invaluable for refining the selection of archeologically significant anomalies in the data. Excavation

data from the Frontier Pipeline Project can be used to re-examine the selection of the anomalies on this project and can provide additional suggestions for excavation at these sites in the future.

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